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TROPICAL STORM AGNES:

LONG-RANGE FLOOD RECOVERY

AUGUST 1973

THE MITRE CORPORATION

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TROPICAL STORM AGNES: LONG-RANGE FLOOD RECOVERY

L. R. GSELLMAN

S. A. HAUS

R. C. KUEHNEL

S. H. LUBORE

R. T. WAGAMAN

Contract No.: ME #7275

Sponsor: Commonwealth of Pennsylvania
Office of State Planning and Development

Federal Project No.: CPA-PA-03-26-1050/ARC 73-85

MITRE Project No.: 2190

AUGUST 1973

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Approved for Project Distribution: S. H. Lubore

S. H. Lubore

Approved for MITRE Distribution: Robert P. Ouellette

R. P. Ouellette

ABSTRACT

This report documents the MITRE effort in support of the Pennsylvania Office of State Planning and Development (OSPD) Program to develop a long-range plan for recovery from the ravages of Tropical Storm Agnes. The report is a compilation of four separate but related tasks. The first task identifies flood recovery needs and sources of federal and state funds which might be available to satisfy these needs. The second task is an evaluation of Disaster Urban Renewal Projects using a structured value approach to rank projects and dynamic programming to allocate funds to projects in order to optimize the value received by the state for each of several budgets. The third task is a general methodology to be followed in evaluating proposed flood protection projects. The final task is a description of a Flood Damage/Recovery data base, including potential data sources, for possible use in the development of the OSPD long-range recovery plan.

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SECTION I

EXECUTIVE SUMMARY

THE DISASTER

On June 23, 1972, Tropical Storm Agnes struck Pennsylvania and created "the greatest civic disaster in the history of the Republic."[1] Total damage in Pennsylvania is estimated at more than $3 billion. Miraculously, only 44 lives were lost; however, 20,000 families were displaced and 111,000 homes and hundreds of industrial and commercial establishments were destroyed or damaged.[2] Every municipality on the Susquehanna River's flood plain, especially in the Wyoming Valley of Luzerne County, was severely affected. Sanitation and waste disposal systems were broken down. The sewered population was threatened with lack of treatment facilities and disposal options.

Resource destruction may have exceeded losses to works of man. Forests, water courses, water tables, fish and wildlife, and farm soils received damage yet uncomputed. Environmental damage may have exceeded property damage. Such losses will affect generations to come. Problems of infrastructure adequacy and environmental quality were added to old problems of mine subsidence and drainage. These factors complicate the problem of flood recovery for the entire Susquehanna River Basin in Pennsylvania.

THE DISASTER RECOVERY AREA

The Susquehanna River Basin suffered the majority of the damage from Tropical Storm Agnes. "The Susquehanna is the longest river draining into the Atlantic Ocean, rising in Ostego Lake in central New York. It dips into the north portion of Susquehanna County

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[1] Congressman Daniel J. Flood, Wilkes-Barre Times Leader, June 26-28, 1972.

[2] Office of Emergency Preparedness Memorandum, Carney to Grace, October 31, 1972. 8,471 houses destroyed, 102,916 in need of repairs.

(Pennsylvania), and back into New York before it finally bends southward through Bradford County. It flows to the southeast through the Allegheny Plateau and breaks into the Ridge and Valley province of the Newer Appalachian Mountains at Pittston where it is joined by the Lackawanna River from the northeast. From there, following a longitudinal valley, it moves southwesterly to Sunbury where it is joined by the 228 mile long West Branch which rises in the Appalachian Plateau country of northern Indiana County. From Sunbury it flows south until it is joined by the Juniata River flowing from the west through the Ridge and Valley province. Just below this confluence it cuts through Blue Mountain near Harrisburg and emerges in an impressive mile-wide bed that moves southeasterly to the Chesapeake Bay and on to the Atlantic Ocean."[3] The watershed touches 43 counties. Of these counties, 30 have suffered significant damage. Additional damage was sustained in the Southeastern and Southwestern portions of the Commonwealth.

The flood damage was concentrated in the four multi-county, sub-state development regions: Northeast, Susquehanna, Northern Tier, and Capital. The single most devastated area was in the Wyoming Valley of Luzerne County. This latter area sustained from one quarter to one third of the total property damage of the Commonwealth, as well as having 100,000 residents forced into temporary housing. In the mountainous sectors of the disaster area, most human settlements are located on or very close to flood plains due to the barrier effect of extreme slopes. This situation is especially true in the case of smaller rural settlements that characterize much of the Appalachian area.

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[3] U.S. Army Corps of Engineers, Office of Appalachian Studies, Development of Water Resources in Appalachia, Part II, Subregional Plans, Volume 3, November 1969.

There are two highlights found in the damage profile of the disaster area: (1) the highest urban damage occurred in the Wyoming Valley in Northeastern Pennsylvania; (2) the highest rural agricultural and transportation damage occurred in the central portion of the Commonwealth in the Susquehanna Region.

FLOOD RECOVERY PLANNING EFFORT

Immediately following the flood, all efforts within the Commonwealth were directed toward "rescue and relief" operations. Upon completion of the "rescue and relief" efforts, Pennsylvania's Office of State Planning and Development (OSPD) began work on a "Work Program for Flood Recovery Planning." The work program was completed by the end of August and submitted to the Federal Regional Council (FRC). At a joint meeting of FRC, state and regional planners, held on September 7, 1972, the Federal representatives indicated that the Commonwealth's "Work Program for Flood Recovery Planning" was generally acceptable. Final approval and authorization of funds was received in November.

A diagram showing the various efforts involved in the OSPD work program, and their interrelationships is shown in Figure 1. During November, a contract was signed with The MITRE Corporation to support OSPD in executing their work program. MITRE's effort consisted of four tasks:

- Identify flood recovery programs (needs) and specify funds available to satisfy these needs
- Evaluate Disaster Urban Renewal projects using structured value analysis and dynamic programming
- Establish guidelines for evaluating flood protection projects
- Define a Flood Damage/Recovery data base.

Following is a summary of the results of each of the four tasks. The detailed description of MITRE's efforts is presented in Sections II through V.

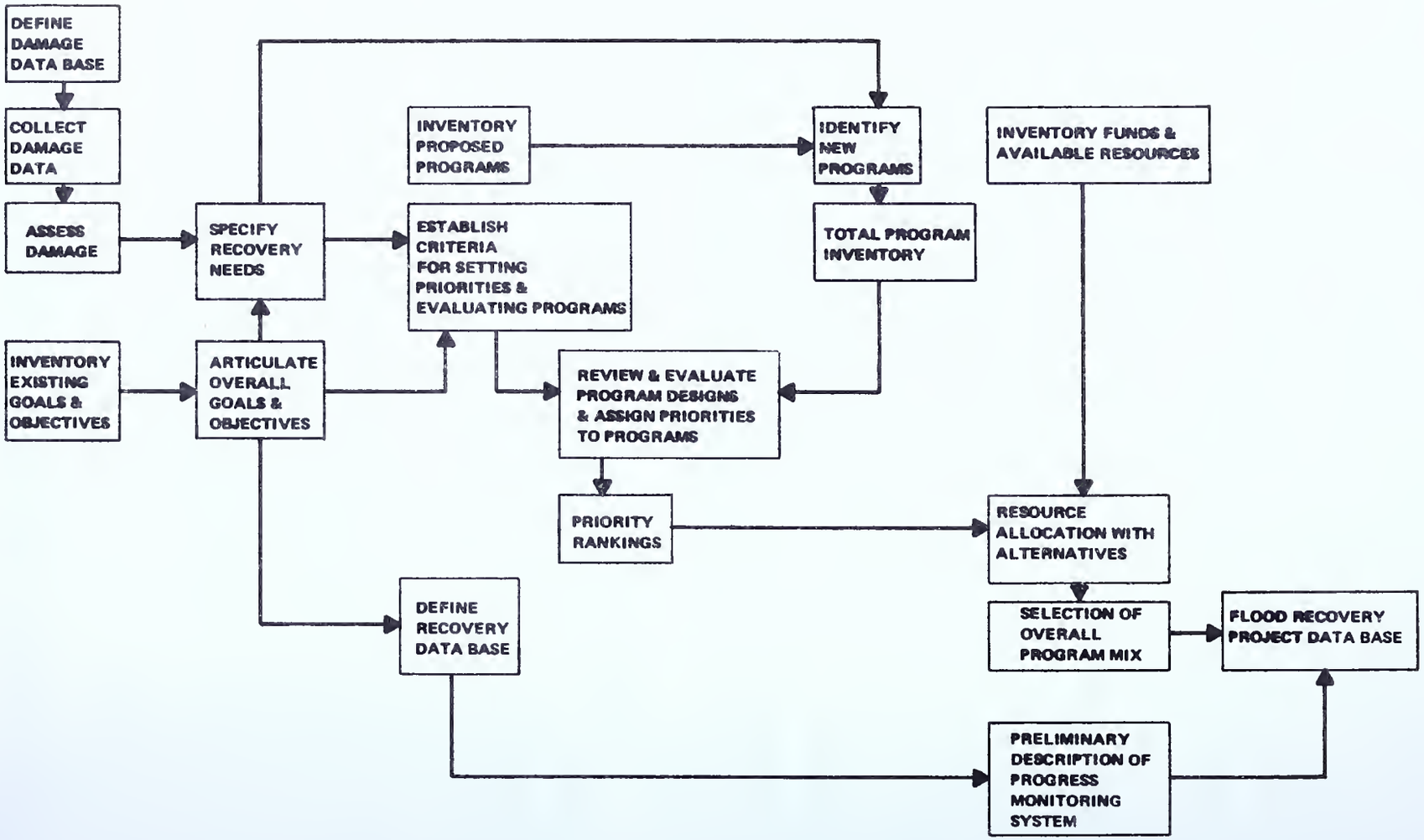

FIGURE 1
LONG RANGE FLOOD RECOVERY PLANNING EFFORT

FLOOD RECOVERY PROGRAMS

The generation of a long-range flood recovery plan entails the delineation and evaluation of the unmet needs of the Commonwealth which can be attributed to the Agnes disaster. Based upon a review of available damage data and interviews conducted with planning personnel from both state and regional agencies, a set of programs and sub-programs needed to satisfy unmet needs was developed by MITRE. This set of programs was used, in part, as a basis for a survey, the "Questionnaire to Determine Program Effectiveness, Needs and Priorities for Flood Recovery," developed and conducted by the Pennsylvania Office of State Planning and Development (OSPD).

Based upon a review of the results of the survey, nine programs were identified as required to satisfy unmet needs, priorities were assigned to the programs and general descriptions of the program characteristics were developed. The nine programs identified, in order of priority, are:

(a) Flood Protection
(b) Housing
(c) Water and sewage systems
(d) Unemployment and industrial development
(e) Agriculture
(f) Health and other social services
(g) Transportation
(h) Problems of the elderly
(i) Mine-related problems.

Both Federal and State sources of funds to support the nine programs were identified. The Federal sources were obtained from the 1972 Catalog of Federal Domestic Assistance and state sources from the Catalog of State Aids to Local Government.

The results of this task provide only a framework for the development of a Long-Range Flood Recovery Plan. Specific projects must be developed for each program. The regional flood recovery plans will provide a basis for identifying these projects. These projects must then be evaluated concurrently to determine the most desirable mix of projects to be supported by state and federal funds.

DISASTER URBAN RENEWAL

After Agnes, the federal government authorized the expenditure of $400 million in grants for Disaster Urban Renewal Projects. In response to the authorization, the Department of Housing and Urban Development (HUD) received 80 applications requesting more than $600 million. MITRE evaluated these projects using Structured Value Analysis (SVA) and dynamic programming to determine at various funding levels the mix of projects which maximizes the value to the state.

The primary objective of the analysis was to demonstrate the use of the technique in developing project mixes for the Long-Range Flood Recovery Plan once data are available later in the planning process. Secondary objectives of the analysis were:

(a) Identify differences between project selections made by HUD and those selected based upon OSPD-generated criteria

(b) Identify projects, rejected by HUD which should be considered for inclusion in the Long-Range Flood Recovery Plan.

Data used in the analysis were obtained from that provided by each project applicant on the "Survey and Planning Application." These data, in conjunction with value curves and weights defined by OSPD personnel, were input to MITRE's SVA model to develop values for each project. Finally, the value obtained from SVA, along with each project's cost, were evaluated using dynamic programming to determine at various funding levels the mix of projects which maximizes the value to the Commonwealth.

A total federal grant of $612.8 million is required to fund every project at the 100 percent level; however, the marginal return from expenditures above $420 million rapidly approaches zero. It is thus quite possible that the $420 million level of funding would be the most productive for the Commonwealth. Additional funds might be better spent for other programs.

When the project mix obtained using the above procedure at the federally allocated funding level of $380.4 million was compared to the projects selected by HUD, the differences were considerable. The major difference appears to be that federal funding was allocated to projects in which a large portion of the residential buildings were destroyed and a large portion of the pre-flood families were no longer residents. On the other hand, the value structure developed by OSPD personnel resulted in the selection of projects which contained a large portion of damaged but usable and unusable but repairable residential buildings and a large portion of pre-flood families remaining in the area.

OSPD's goals for Disaster Urban Renewal Projects as reflected in the value curves and weights provided for the SVA analysis, may be summarized as follows:

> Re-establish the damaged areas as viable communities and provide for a maximum increase in available housing in the shortest period of time.

HUD's goal, based upon an analysis described in the above paragraph, appears to be:

> Clear the most devastated areas and provide a basis for their redevelopment or alternative use.

It is not surprising that the project mixes using these goals are considerably different.

In addition to the selection of a project mix, a sensitivity analysis was conducted by MITRE to determine the effect of changes in input data on each project's value. Each input parameter was changed

by ± 10 percent and new project values and rankings determined. The analysis showed that the project rankings remain essentially unchanged. In effect, the sensitivity analysis showed the project mixes obtained from the dynamic programming allocation to be optimal even for ± 10 percent changes in the parameter values.

Since most of the Disaster Urban Renewal Projects have been approved and funds allocated, the value of this analysis appears to be more important as a demonstration of the technique for use in developing project mixes for other programs, including additional urban renewal programs, identified in the flood recovery planning process, than in supporting project selection decisions for the allocation of the critical $400 million of Federal Disaster Urban Renewal funds. The techniques developed by MITRE can serve as a valuable planning tool for future OSPD planning activities.

FLOOD PROTECTION PROJECTS

The third task conducted by MITRE was the development of guidelines for the evaluation of proposed flood protection projects. The purpose of these guidelines is to provide OSPD with a framework for evaluating the proposed projects and commenting on their desirability as they relate to the overall flood recovery plans and state goals. In summary, the guidelines are designed to ensure that:

(a) The project is consistent, and not in conflict, with state and local goals and plans

(b) The project does not cause undesirable or adverse impacts on surrounding areas

(c) The Environmental Impact Statement is complete and accurate

(d) All realistic alternatives for implementation of the project have been considered and that the most desirable alternative is selected

(e) The feasibility or infeasibility of each alternative has been completely and accurately determined.

FLOOD DAMAGE/RECOVERY DATA BASE

As the final task performed in this study MITRE designed a flood damage/recovery data base and identified potential data sources. The Flood Damage/Recovery Data Base design consists of three sections:

(a) Damage Estimates (Real Property)

(b) Recovery Expenditures

(c) Impact and Recovery Monitoring.

The design classifies real property damage estimates as either private or public. The private real property data structure is based upon the taxonomy of activities contained in the Standard Industrial Classification Manual published in 1967 by the Bureau of the Budget. Use of this format is compatible with existing damage data and consistent with other planning data sources such as the Census of Manufacturers, the U.S. Decennial Census, and the Pennsylvania Abstract. The public real property data structure is based upon the structure used by the Office of Emergency Preparedness (OEP) in reviewing and appraising requests for federal disaster relief funds. Since OEP is the primary source of data for damage to public facilities, any other categorization would require a major data translation effort.

The design further classifies real property damage data by location and category or type of property damaged. The primary location indicator is the county, although, in some cases, data are available in greater detail, e.g., by ZIP code. Four categories of property damage are used:

(a) Land and improvements

(b) Buildings

(c) Machinery and equipment

(d) Inventory.

This categorization is dictated by the level of detail available from the identified data sources.

The recovery expenditure data specifies that the data base be composed of expenditures to repair damage to real property and other expenditures for flood-related damage, both direct and indirect. The data structure for expenditures for real property is identical to that used for the damage data. The second part, expenditures for flood related damage, includes all other expenditures during all phases of the recovery effort which could not be directly related to the repair or replacement of real property. This category includes such items as debris removal, temporary housing, food stamps, emergency unemployment programs, public assistance, funds for recovery planning efforts, etc. Expenditures are further classified by source and, in the case of state and federal expenditures, by type (i.e., grant or loan).

The third section of the data base, Flood Impact/Recovery Monitoring data, specifies a temporal set of data beginning with the first quarter of 1971 and continuing through the end of 1975. (The data base, of course, can be continued past the end of 1975 if it appears that the data will be useful for either long-range flood recovery planning or other planning efforts.) The data base would consist of 23 activities with an average of nine indicators per activity. There are 15 business activities by Standard Industrial Classification (SIC) code, 3 government activities, and 5 general social activities. As in the case of the first two sections of the data base, the Flood Impact/Recovery Monitoring data base can, in general, be developed down to the county level. For some indicators, a ZIP code level of detail is available.

Two schemes for implementing the Flood Damage/Recovery Data Base are available, i.e., as a manual data base or as a computerized data base. A manual data base is feasible, especially if industrial activity is not separated below the major division level. However, the manual system has several major drawbacks, which warrant serious

consideration. First, it is not cost-effective for a manual data base to contain the level of detail which could be contained in an automated data base. For example, in the manual data base, all data detail below the county level will probably have to be ignored; whereas, if the data base is automated, greater detail, when available, can be retained for possible future use.

Second, a manual data base does not provide the flexibility to rapidly and inexpensively provide summary reports in a variety of formats. This is an important feature if the data base is to be used effectively to develop reports to support OSPD's data requirements for planning and the regions' request for data. OSPD's ability to support the regions with a consistent, integrated data base is important because it provides common centralized data around which all regional plans are developed. In addition, it provides a vehicle which could be used as a means for developing closer working relationships with the regions and improving state-regional coordination.

Based on the foregoing, it is concluded that an effort should be started to develop a computerized data base to support long-range flood recovery planning efforts within the Commonwealth of Pennsylvania. In the context of developing a computerized data base, the effort conducted in this study provides only a framework. Four additional efforts are required before a responsive automated data base can become a reality:

(a) Identification of detailed user data requirements
(b) Development of guidelines for data collection
(c) Selection of a data management system
(d) Development of software, procedures, and documentation for the operation, maintenance and updating of the data base.

The data base design presented in this report is based upon a preliminary requirements analysis. As a result, it should be considered

as tentative until steps (a) through (d) have been completed. One means of performing the detailed requirements analysis is to use the data base described herein as a focal point for identification of functional needs and activities of potential state and local users.

Two other data sources warrant specific consideration. The first source is the comptrollers of state agencies which established accounts to permit the audit and certification of flood-related expenditures. The comptrollers, therefore, have at their disposal detailed information regarding the expenditure of state disaster relief funds. The second source is data collection systems designed to support or implement new laws. An example is the application form being used by the Department of Community Affairs to implement the Real Estate Tax Reimbursement Program. This form could have been designed to collect additional information which would have been valuable to include in the data base. It is important that the individual responsible for maintaining the data base keep informed of new laws and to consider their potential use as a vehicle to obtain needed data.

SECTION II

FLOOD RECOVERY PROGRAMS

BASIS FOR PLANNING

The generation of a long-range flood recovery plan entails the delineation and evaluation of the unmet needs of the Commonwealth which can be attributed to the Agnes disaster. A delineation of these needs must be based upon an analysis of the damages (physical, economic and psychological) and the degree to which restoration and recovery operations to date have alleviated the problems caused by these damages.

Much of the effort required to assess these needs is still in progress, both at the State and lower planning levels. An initial estimate of these needs is currently being made by State and regional planners. This estimate is based upon actual damage and expenditure data, but final results at the levelof detail needed are not yet available. As a surrogate to such an analysis, the Pennsylvania office of State Planning and Development (OSPD) prepared and distributed in March 1973 a "Questionnaire to Determine Program Effectiveness, Needs and Priorities for Flood Recovery." Analysis of the returns from 84 local, county, and regional planning bodies is useful in qualitatively determining the major recovery needs faced by the Commonwealth.

Based upon the responses, the concensus of respondents indicates that provision of adequate flood control and flood protection projects is the greatest problem confronting Pennsylvania communities. Problems associated with housing and water and sewage treatment seem to rank next on the list of unmet needs although there is no universal agreement even in the most devastated areas. While there is agreement that mine related problems were the lowest priority need generated by Agnes, other problem areas were ranked quite differently by the respondents. Since the responses were from several different local and regional areas, these disparities are to be expected. OSPD is currently

conducting a follow-up survey to better delineate and quantify the unmet needs in each local or regional area.

FUNDING SOURCES

The remainder of this section briefly describes the principal unmet flood recovery needs in broad terms. Associated with each category of needs is a list of potential sources of financial and technical support. The federal programs which are identified are based upon the 1972 Catalog of Federal Domestic Assistance published in May 1972 by the Office of Management and Budget, Executive Office of the President. The State programs available to local governments is based upon the Catalog of State Aids to Local Government published in 1971 by The Pennsylvania Department of Community Affairs.

It should be realized that the emphasis toward federal revenue sharing programs coupled with Administration efforts to curtail federal spending have resulted in many changes in the federal assistance programs. For example, a major reorganization within the Department of Health, Education and Welfare's Health Services and Mental Health Administration (HSMHA) may result in several program changes. In particular, it appears that Hill-Burton funds will no longer be available for support of hospital construction. Similarly, a moratorium has been declared on many of the Department of Housing and Urban Development programs pending community development revenue sharing.

In attempting to identify federal financial support available to the Commonwealth and local governments, many programs which only provide advice or technical assistance were not included. Also many research and training programs exist which should be available to the Commonwealth but are not considered as major resources for flood recovery.

It is hoped that the programs identified will begin to give an indication of the types and form of federal and state assistance to local governments. While the names and characteristics of many programs may change, most support will continue to be available in

one form or another. To ensure that the list of programs is maintained, a procedure should be developed whereby changes in federal programs are monitored and appropriate modifications to the list are made.

FLOOD PROTECTION

In the recent survey of Regional and local planning agencies, the most often articulated unmet need arising from Tropical Storm Agnes is for improved flood protection. Practically every community along the Susquehanna suffered severe damage due to the Agnes flooding. Current plans of the U.S. Army Corps of Engineers are directed at establishing greater protection against flooding in the Wyoming Valley, Harrisburg and Lock Haven areas. Considerable additional protection is required for other communities in the flood ravaged areas of the Susquehanna, Capital, Northeastern and the Northern Tier portions of the Commonwealth.

Flood Protection or (more properly) Flood Damage Prevention can be classified broadly into corrective measures and preventive measures[4]. Potential damage resulting from recurrence of flooding similar to the Agnes flooding can be minimized through a combination of both types of measures.

Corrective Measures

The Commonwealth and federal governments have taken steps to restore existing facilities to pre-flood conditions. Future actions will be directed towards a variety of programs to provide a degree of protection from flooding. These programs should consist of a mix of corrective measures of the following types:

(a) Physical barriers to flood water encroachment--dams, reservoirs, pumping stations, levees and floodwalls

(b) Improvements in flow conditions in river and stream channels--channel straightening, removal of obstructions from river and stream beds, widening and deepening of channels, and stream bank stabilization

(c) Watershed Treatment--crop rotation, terracing, contouring, and reforestation

[4] Guidelines for Reducing Flood Damages, U.S. Army Corps of Engineers, Vicksburg, Mississippi, May 1967.

(d) Floodproofing--seepage control, sewer and utility adjustments, protective coverings, roadbed protection, raising structures above flood plain, and architectural design

(e) Flood forecasting and temporary evacuation--local disaster planning, emergency stockpiling of supplies, and public information programs.

Possible Sources of Financial Support:

Federal Programs

10.416 Soil and Water Loans, USDA (FHA)

10.419 Watershed Protection and Flood Prevention Loans, USDA (FHA)

10.650 State and Private Forestry Cooperation (Cooperative Forestry), USDA (FS)

10.901 Resource Conservation and Development, USDA (SCS)

10.904 Watershed Protection and Flood Prevention (Small Watershed (PL-566) Program), USDA (SCS)

11.300 Economic Development Grants and Loans for Public Works and Development Facilities, DOC (EDA)

11.402 River and Flood Forecasts, DOC (NOAA)

12.102 Flood Control Works and Federally Authorized Coastal Protection Works, Rehabilitation (Public Law 99 Program), DOD (COE)

12.105 Protection of Essential Highways, Highway Bridge Approaches, and Public Works (Emergency Bank Protection), DOD (COE)

12.106 Flood Control Projects (Small Flood Control Projects), DOD (COE)

12.108 Snagging and Clearing for Flood Control, DOD (COE)

12.308 Civil Defense - Federal Surplus Personal Property Donations (Surplus Property Program), DOD (OCD)

13.216 Emergency Health - Medical Stockpile, DHEW (HSMHA)

23.001 Appalachian Regional Development (Appalachian Program), ARC

23.002 Appalachian Supplements to Federal Grant-in-Aid (Supplemental Grants), ARC

State Programs

104 Soil and Water Conservation Districts

301 Appalachian Program Aids

303 Site Development Grants

600 Flood Control Financial Assistance

601 Flood Control Assistance

603 Stream Clearance

604 Forest Advisory Services

1201 Surplus Federal Property Donation Program

1700 Administration of State Disaster Assistance

1701 Federal Aid to Civil Defense Programs

1703 Disaster Assistance - Federal

Preventive Measures

Several preventive measures will be undertaken as a part of the long-range flood recovery effort. The extensive Urban Renewal activities in the Commonwealth provide a unique opportunity to enact flood plain regulations and institute preferred flood plain management practices. In order to obtain Federal Flood Insurance, local governments will enact effective zoning plans and other ordinance administration to prevent future development of floodways and prudent use of flood plains. Preventive measures will be established as a mix of the following options:

(a) Flood Insurance of properties prone to flooding.

(b) Local zoning ordinances, building codes and subdivision regulations for development in flood plains.

(c) Development of recreation and other open spaces in flood plains.

(d) Reduced taxes for agricultural, open space and recreation lands in flood plains adjacent to developing communities.

(e) Assurance of adequate bridge and roadway waterway openings and heights above flood flows.

(f) Evacuation and relocation from flood plains.

Possible Sources of Financial Support:

Federal Programs

12.104 Flood Plain Management Services, DOD (COE)

14.001 Flood Insurance, HUD (FIA)

14.303 Open Space Land Programs, HUD (CD)

14.307 Urban Renewal, HUD (CD)

15.400 Outdoor Recreation - Acquisition and Development (Land and Water Conservation Fund Grants), DOI (BOR)

20.205 Highway Research, Planning, and Construction (Federal-Aid Highway Program), DOT (FHWA)

20.213 Special Bridge Replacement, DOT (FHWA)

23.001 Appalachian Regional Development (Appalachian Program), ARC

23.002 Appalachian Supplements to Federal Grant-in-Aid (Supplemental Grants), ARC

State Programs

301 Appalachian Program Aids

402 Municipal Consulting Services

406 Informational Services to Local Governments

412 Redevelopment Financial Assistance

414 Parks and Recreation Technical Services

415 500 Million Dollar Conservation Bond Issue Program

HOUSING

Tropical Storm Agnes caused severe damage or destruction of over 40,000 homes in Pennsylvania. Over 25,000 of these residences are in Luzerne County. As of December 5, 1972, Small Business Administration loans had been approved in the amount of $369.3 million. Disaster Urban Renewal project costs (federal, state and local shares) for the Luzerne County communities alone are estimated to be in excess of $271 million. Total urban renewal in Pennsylvania will amount to over $1 billion. Rural housing losses are small compared to urban damage, but still are significant.

The available federal funding (grants and loans) for urban renewal projects is $525 million less than the amount requested. Some areas of the state had shortages of modern housing prior to the Agnes flooding, particularly the Wyoming Valley area. There exists a need for programs

to create more housing at low mortgage interest rates. Low and moderate income housing for urban and rural areas is required as well. Plans will be developed to increase the supply of housing and will be coordinated with the other aspects (transportation, flood protection, industrial development, etc.) of the long-range recovery efforts. Consideration will be made to restrict new home construction in areas subject to recurring flooding and areas of high surface subsidence risk.

Possible Sources of Financial Support:

Federal Programs

10.405 Farm Labor Housing Loans and Grants (Labor Housing), USDA (FHA)

10.407 Farm Ownership Loans, USDA (FHA)

10.410 Low to Moderate Income Housing Loans (Rural Housing Loans), USDA (FHA)

10.411 Rural Housing Site Loans (Section 523 and 524 Site Loans), USDA (FHA)

10.415 Rural Rental Housing Loans, USDA (FHA)

10.417 Very Low-Income Housing Repair Loans (Section 504 Housing Loans), USDA (FHA)

10.420 Rural Self-Help Housing Technical Assistance (Section 523 Technical Assistance), USDA (FHA)

14.103 Interest Reduction Payments - Rental and Cooperative Housing for Lower Income Families (236), HUD (FHA)

14.104 Interest Subsidy - Acquisition and Rehabilitation of Homes for Resale to Lower Income Families (Section 235(j) Project Mortgage), HUD (FHA)

14.105 Interest Subsidy - Homes for Lower Income Families (235(i)), HUD (FHA)

14.106 Interest Subsidy - Purchase of Rehabilitated Homes by Lower Income Families (235(j) Homes), HUD (FHA)

14.110 Mobile Home Loan Insurance - Financing of Mobile Home as Principal Residence (Title I), HUD (FHA)

14.112 Mortgage Insurance - Construction or Rehabilitation of Condominium Projects (234(d)), HUD (FHA)

14.113 Mortgage Insurance - Conversion of Below Market Rate Rental Housing to Condominium Ownership (221(i) (Homes)), HUD (FHA)

14.115 Mortgage Insurance - Development of Sales Type Cooperative Projects (213 Development of Sales), HUD (FHA)

14.117 Mortgage Insurance - Homes (203(b)), HUD (FHA)

14.118 Mortgage Insurance - Homes for Certified Veterans (203(b)), HUD (FHA)

14.120 Mortgage Insurance - Homes for Low and Moderate Income Families (221(d)(2)), HUD (FHA)

14.121 Mortgage Insurance - Homes in Outlying Areas (203(i)), HUD (FHA)

14.122 Mortgage Insurance - Homes in Urban Renewal Areas (220 Homes), HUD (FHA)

14.123 Mortgage Insurance - Housing in Older, Declining Areas (223(e)), HUD (FHA)

14.124 Mortgage Insurance - Investor Sponsored Cooperative Housing (213 Investor Sponsor), HUD (FHA)

14.125 Mortgage Insurance - Land Development and New Communities (Title X), HUD (FHA)

14.126 Mortgage Insurance - Management Type Cooperative Projects (Management Type), HUD (FHA)

14.127 Mortgage Insurance - Mobile Home Courts (207 Mobile Home Courts), HUD (FHA)

14.130 Mortgage Insurance - Purchase by Homeowners of Fee Simple Title from Lessors (240), HUD (FHA)

14.132 Mortgage Insurance - Purchase of Sales-Type Cooperative Housing Units (213 Sales), HUD (FHA)

14.133 Mortgage Insurance - Purchase of Units in Condominiums (234(c)), HUD (FHA)

14.134 Mortgage Insurance - Rental Housing (207), HUD (FHA)

14.135 Mortgage Insurance - Rental Housing for Moderate Income Families (221(d)(4)), HUD (FHA)

14.137 Mortgage Insurance - Rental Housing for Low and Moderate Income Families, Market Interest Rate, (221(d)(3) Market Rate), HUD (FHA)

14.138 Mortgage Insurance - Rental Housing for the Elderly (231), HUD (FHA)

14.139 Mortgage Insurance - Rental Housing in Urban Renewal Areas (220 Multifamily), HUD (FHA)

14.140 Mortgage Insurance - Special Credit Risks (237), HUD (FHA)

14.141 Nonprofit Housing Sponsor Loans - Planning Projects for Low- and Moderate-Income Families (Section 106(b), Nonprofit Sponsor Loan Fund), HUD (FHA)

14.146 Public Housing - Acquisition (with or without Rehabilitation) and Construction, HUD (FHA)

14.148 Public Housing-Leased (Leased Housing, Section 23 and Section 10(c)), HUD (FHA)

14.149 Rent Supplements - Rental Housing for Lower Income Families (Rent Supplement Program), HUD (FHA)

14.151 Supplemental Loan Insurance - Multifamily Rental Housing (241), HUD (FHA)

14.152 Mortgage Insurance - Experimental Homes (233 (Homes) - Experimental Housing), HUD (FHA)

14.154 Mortgage Insurance - Experimental Rental Housing (233 (Multifamily) Experimental Housing), HUD (FHA)

14.207 New Communities - Loan Guarantees (Title VII Guarantees), HUD (CPM)

14.307 Urban Renewal Projects, HUD (CD)

14.308 Housing Rehabilitation Grants, HUD (CD)

14.607 Public Housing - Modernization of Projects, HUD (HM)

23.002 Appalachian Supplements to Federal Grant-in-Aid (Supplemental Grants), ARC

23.005 Appalachian Housing Fund (Appalachian Housing Assistance), ARC

23.006 Appalachian Housing Technical Assistance, ARC

23.014 Appalachian Housing Site Development, ARC

39.002 Disposal of Federal Surplus Real Property, GSA

49.002 Community Action, OEO

49.009 Migrant and Seasonal Farmworkers Assistance (III-B Programs), OEO

64.106 Specially Adapted Housing for Disabled Veterans (Paraplegic Housing), VA

64.113 Veterans Housing - Direct Loans and Advances (VA Direct Loans), VA

64.114 Veterans Housing - Guaranteed and Insured Loans (GI Home Loans), VA

64.118 Veterans Housing - Direct Loans for Disabled Veterans, VA

64.119 Veterans Housing - Mobile Home Loans, VA

State Programs

301 Appalachia Program Aids

400 Pennsylvania Urban Assistance Act of 1969

402 Municipal Consulting Service

409 Code Enforcement Financial Assistance

410 Demolition Financial Assistance

411 Housing Assistance

412 Redevelopment Financial Assistance

413 Redevelopment Technical Assistance

416 Comprehensive Planning Technical Assistance

418 State Planning Assistance Program

812 Housing Code Technical Assistance

WATER AND SEWAGE SYSTEMS

The Agnes flooding damaged many municipal and rural water treatment and sewage treatment facilities. In most cases, these facilities were repaired and returned to service a short time after the disaster; however, their operating capabilities were degraded and system lifetimes shortened. Extensive damage to the distribution systems further accelerated their deterioration. Pollution of wells necessitated a new supply of potable drinking water. Septic systems were damaged and their useful lives shortened.

Many rural and smaller urban communities are financially hard pressed to provide facilities which meet any but minimum standards. In the four areas of the Commonwealth hardest hit by Agnes (Northeastern, Northern Tier, Susquehanna and Capital), water and sewage systems problems resulting from Agnes are one of the top three recovery needs.

Key to other recovery programs is the provision of adequate water and sewage treatment and distribution systems. Planning for adequate future water supplies will be done in part by the several river basin commissions.

Possible Sources of Financial Support:

Federal Programs

10.400 Comprehensive Areawide Water and Sewer Planning Grants USDA (FHA)

10.411 Rural Housing Site Loans (Section 523 and 524 Site Loans), USDA (FHA)

10.414 Resource Conservation and Development Loans, USDA (FHA)

10.416 Soil and Water Loans (SW Loans), USDA (FHA)

10.418 Water and Waste Disposal Systems for Rural Communities, USDA (FHA)

11.300 Economic Development - Grants and Loans for Public Works and Development Facilities, DOC (EDA)

11.304 Economic Development - Public Works Impact Projects, DOC (EDA)

14.125 Mortgage Insurance - Land Development and New Communities (Title X), HUD (FHA)

14.153 Mortgage Insurance - Experimental Projects Other than Housing, HUD (FHA)

14.208 New Communities Supplementary Grants for Public Facilities (Title VII Supplementary Grants), HUD (CPM)

14.214 Urban Systems Engineering Demonstration Grants ("Use" Program), HUD (CPM)

14.301 Basic Water and Sewer Facilities - Grants (Water and Sewer Grants), HUD (CD)

14.304 Public Facilities Loans (PFL), HUD (CD)

14.307 Urban Renewal Projects, HUD (CD)

23.001 Appalachian Regional Development (Appalachian Program), ARC

23.002 Appalachian Supplements to Federal Grant-in-Aid (Supplemental Grants), ARC

23.014 Appalachian Housing Site Development, ARC

66.400 Construction Grants for Wastewater Treatment Works, EPA (OWP)

State Programs

104 Soil and Water Conservation Districts

301 Appalachia Program Aids

302 Community Facilities Grant (Harness Racing Bill)

303 Site Development Grants

402 Municipal Consulting Services

801 Sewage Facilities Act Reimbursements

802 Sewage Treatment Plant Operation and Maintenance Grants

804 Federal Grants for Construction of Sewage Treatment Facilities

811 Sanitation Technical Assistance

817 State Grants for the Construction of Sewage Treatment Facilities

UNEMPLOYMENT AND INDUSTRIAL DEVELOPMENT

In the first month following the Agnes disaster, unemployment compensation claims in Pennsylvania rose considerably above those experienced in 1971 for the same period of time[5]. However, the massive restoration and recovery efforts resulted in lower unemployment in August 1972 than that observed in 1971. This trend has continued in subsequent months. However, localized unemployment is still a problem in some areas of the state particularly where major industries were closed. In Lewisburg, for example, unemployment was at 12% as late as January 1973. This city has undertaken a nationwide campaign called Project Recovery to attract new industry and to help rebuild the old.

With the reduction of restoration activities, unemployment levels in the flood areas may again rise. Programs to assist the unemployed exist and new programs to create employment have begun. The unemployment problem will be carefully monitored as part of the long-range recovery effort. Programs will be undertaken to create

[5] Monthly Activity Report of Services Provided to Individuals, Cumulative from July 1972 to Date, Department of Labor and Industry, Bureau of Employment Security, December 1972.

jobs where they are most needed as a result of Agnes. Planning will include the use of the Pennsylvania Industrial Development Authority (PIDA) Fund and industrial site development loans and assistance to the maximum benefit of the affected communities. Vocational education and training will be included in the plans to ensure a skill mix consistent with available employment. Renewal of Central Business Districts (CBD) will also be included in the plans for several communities in order to stimulate economic activity and create additional employment opportunities.

Industrial Development, Capital Investment and Appalachian planning activities of the Commonwealth will be coordinated with the flood recovery planning (statewide and regional) to give preference to programs which enhance the long-range flood recovery efforts.

Possible Sources of Financial Support:

Federal Programs

11.300 Economic Development - Grants and Loans for Public Works and Development Facilities, DOC (EDA)

11.301 Economic Development - Loans for Businesses and Development Companies, DOC (EDA)

11.302 Economic Development - Planning Assistance (Development District Program: Redevelopment Area Program), DOC (EDA)

11.303 Economic Development - Technical Assistance, DOC (EDA)

11.304 Economic Development - Public Works Impact Projects, DOC (EDA)

13.493 Vocational Education - Basic Grants to States, DHEW (OE)

13.494 Vocational Education - Consumer and Homemaking, DHEW (OE)

13.495 Vocational Education - Cooperative Education, DHEW (OE)

13.496 Vocational Education - Curriculum Development, DHEW (OE)

14.207 New Communities - Loan Guarantees (Title VII Guarantees), HUD (CPM)

17.204 Concentrated Employment Program (CEP), DOL (MA)

17.205 Cooperative Area Manpower Planning System (CAMPS), DOL (MA)

17.207 Employment Service, DOL (MA)

17.210 Computerized Job Placement, DOL (MA)

17.212 Job Opportunities in the Business Sector (JOBS), DOL (MA)

17.215 Manpower Development and Training - Institutional Training (MDTA Institutional), DOL (MA)

17.223 Operation Mainstream (Mainstream), DOL (MA)

17.224 Public Service Careers, DOL (MA)

17.225 Unemployment Insurance - Grants to States, DOL (MA)

17.226 Work Incentive Program - Training and Allowances (WIN), DOL (MA)

17.227 Job Opportunities in the Business Sector - Optional Program (JOBS Optional), DOL (MA)

17.228 National On-the-Job Training, DOL (MA)

17.229 Public Employment Program (PEP), DOL (MA)

23.001 Appalachian Regional Development (Appalachian Program), ARC

23.002 Appalachian Supplements to Federal Grant-in-Aid (Supplemental Grants), ARC

23.008 Appalachian Local Access Roads, ARC

23.011 Appalachian State Research, Technical Assistance, and Demonstration Projects (State Research), ARC

23.012 Appalachian Vocational Education Facilities and Operations, ARC

23.016 Appalachian Vocational and Technical Education Demonstration Grants, ARC

59.012 Small Business Loans (Regular Business Loans - 7(a) Loans), SBA

59.013 State and Local Development Company Loans (501 and 502 Loans), SBA

State Programs

300 Industrial Development Assistance Grants

301 Appalachia Program Aids

302 Community Facilities Grant (Harness Racing Bill)

303 Site Development Grants

305 Tourist Promotion Matching Fund Program

407 Anti-Poverty Advisory Service

408 Central Business District Planning Financial Assistance

412 Redevelopment Financial Assistance

418 State Planning Assistance Program

502 Community College Financial Assistance

1001 Apprenticeship and Training Program

AGRICULTURE

The ravages of Agnes destroyed crops, livestock and farm equipment and structures. This disaster coupled with poor growing conditions (droughts and early frost) following the flooding and heavy rains resulted in large financial burdens upon the farmers and agricultural sector of the Commonwealth economy. Many marginal farms were deemed to be ineligible for federal aid. Erosion and nutrient leaching of the soil may result in losses in agricultural productivity in the flooded areas for years to come.

Recent OSPD estimates of agricultural damages are in excess of $150 million. As of April 9, 1973, only $601,500 in federal aid from the U.S. Department of Agriculture had been received (this figure does not include SBA farm home loans). Much agricultural damage suffered by private farms such as income lost from crop destruction was not eligible as a casualty loss under the Internal Revenue Service code. In addition, many federal programs are available only if individual farmers cannot obtain sufficient credit elsewhere (regardless of interest rates).

Programs to aid individual farmers and to restore the fertility and productivity of the land will be incorporated into the long-range recovery planning.

Possible Sources of Financial Support

Federal Programs

10.050 Rural Environmental Assistance (REAP), USDA (ASCS)

10.061 Emergency Livestock Feed Program, USDA (ASCS)

10.404 Emergency Loans, USDA (FHA)

10.406 Farm Operating Loans, USDA (FHA)

10.407 Farm Ownership Loans, USDA (FHA)

10.409 Irrigation, Drainage and other Soil and Water Conservation Loans, USDA (FHA)

10.414 Resource Conservation and Development Loans, USDA (FHA)

10.416 Soil and Water Loans (SW Loans), USDA (FHA)

10.450 Crop Insurance, USDA (FCIC)

10.901 Resource Conservation and Development, USDA (SCS)

10.903 Soil Survey, USDA (SCS)

14.143 Property Improvement Loan Insurance - Construction of Nonresidential Farm Structures (Title I, Section 2, Class 2 (b)), HUD (FHA)

64.112 Veterans Farm Loans (GI Farm Loans), VA

State Programs

104 Soil and Water Conservation Districts

HEALTH AND OTHER SOCIAL SERVICES

While problems of the health of the general population were not a major consequence of Agnes, consideration of adequate health services is an important one in the long-range flood recovery planning effort. The financial burdens placed upon many individuals due to Agnes generally result in a gradual decline in personel well-being and can lead to a deterioration in physical and mental health. Many individuals will only reluctantly procure health services when there are more pressing needs for money (health services of course are more important but human nature tends to value physical needs before health until sickness ensues).

The provision of adequate and integrated health and other social services into the rural and urban development and renewal activities will be made in the long-range flood recovery plan. The experimental United Services Agency Program which has been established as a one-stop assistance center in the Wyoming Valley is a prime example of the type of integrated services which will be considered. Similar programs are perhaps even more important in rural areas.

Health and Social Services programs for the aged are described in the section entitled "Problems of the Elderly." In addition,

programs directed towards alcoholism, drug abuse and narcotic addiction, juvenile delinquency, mental health (this is covered under Problems of the Elderly, p.33), communicable diseases, developmental disabilities and rehabilitation of the handicapped have not been included in the long-range flood recovery effort since there is no evidence that any of these categories of social problems were created or aggravated by the Agnes disaster. These programs, of course, are important to the Commonwealth and must be considered in the normal planning processes. Employment related social services and assistance are included in the section entitled "Unemployment and Industrial Development."

Possible Sources of Financial Support:

Federal Programs

10.500 Cooperative Extension Service, USDA (ES)

10.550 Food Distribution (Food Donation Program), USDA (FNS)

10.551 Food Stamps, USDA (FNS)

10.552 Special Food Service Program for Children (Nonschool Food Program), USDA (FNS)

10.553 School Breakfast Program, USDA (FNS)

10.554 Nonfood Assistance for School Food Programs (Equipment Program), USDA (FNS)

10.555 National School Lunch Program (School Lunch Program), USDA (FNS)

10.556 Special Milk Program for Children (School Milk Program), USDA (FNS)

13.206 Comprehensive Health Planning-Areawide Grants (314(b), Partnership for Health), DHEW (HSMHA)

13.207 Comprehensive Health Planning-Grants to States (314(a), Partnership for Health), DHEW (HSMHA)

13.208 Comprehensive Public Health Planning-Training, Studies and Demonstrations (314(c), Partnership for Health), DHEW (HSMHA)

13.210 Comprehensive Public Health Services-Formula Grants (314(d), Partnership for Health), DHEW (HSMHA)

13.211 Crippled Children's Services (CC), DHEW (HSMHA)

13.212 Dental Health of Children (Dental Care Projects), DHEW (HSMHA)

Federal Programs (Continued)

13.217 Family Planning Projects, DHEW (HSMHA)

13.218 Health Care of Children and Youth (Children and Youth Projects), DHEW (HSMHA)

13.220 Health Facilities Construction Grants (Hill-Burton Program), DHEW (HSMHA)

13.224 Health Services Development-Project Grants (Section 314(e), Partnership for Health), DHEW (HSMHA)

13.226 Health Services Research and Development-Grants and Contracts, DHEW (HSMHA)

13.230 Intensive Infant Care Projects (Newborn Care), DHEW (HSMHA)

13.232 Maternal and Child Health Services (MCH), DHEW (HSMHA)

13.233 Maternal and Child Health Training, DHEW (HSMHA)

13.234 Maternity and Infant Care Projects (M&I), DHEW (HSMHA)

13.246 Migrant Health Grants, DHEW (HSMHA)

13.248 Disease Control-Nutrition, DHEW (HSMHA)

13.249 Regional Medical Programs - Operational and Planning Grants, DHEW (HSMHA)

13.253 Health Facilities Construction-Loans and Loan Guarantees (Hill-Burton), DHEW (HSMHA)

13.256 Health Maintenance Organization Service (HMOS), DHEW (HSMHA)

13.261 Family Health Centers (314(e)), DHEW (HSMHA)

13.267 Urban Rat Control, DHEW (HSMHA)

13.707 Child Welfare Services, DHEW (SRS)

13.714 Medical Assistance Program (Medicaid (Title XIX)), DHEW (SRS)

13.748 Work Incentive Program-Child Care (WIN), DHEW (SRS)

13.754 Public Assistance-Social Services (Social Services), DHEW (SRS)

13.757 Comprehensive Social and Rehabilitation Research (SRS Research), DHEW (SRS)

13.761 Public Assistance-Maintenance Assistance (State Aid) (Maintenance Assistance), DHEW (SRS)

14.116 Mortgage Insurance-Group Practice Facilities (Title XI), HUD (FHA)

14.128 Mortgage Insurance-Hospitals (242), HUD (FHA)

14.153 Mortgage Insurance-Experimental Projects other than Housing, HUD(FHA)

23.001 Appalachian Regional Development (Appalachian Program), ARC

23.002 Appalachian Supplements to Federal Grant-in-Aid (Supplemental Grants), ARC

23.013 Appalachian Child Development, ARC

49.002 Community Action, OEO

49.003 Comprehensive Health Services, OEO

49.006 Family Planning, OEO

49.008 Legal Services, OEO

64.009 Veterans Hospitalization (VA Hospitalization), VA

64.011 Veterans Outpatient Care, VA

64.016 Veterans State Hospital Care, VA

State Programs

301 Appalachia Program Aids

400 Pennsylvania Urban Assistance Act of 1969

407 Anti-Poverty Advisory Service

800 Local Health Department Financial Assistance

1300 Federal Food Stamp Program Administration

1303 Child Welfare Service Grants

1307 Child Welfare Services-Consultation

1309 Hospital and Medical Facilities Survey and Construction-Hill-Burton Program (Federal)

TRANSPORTATION

Transportation-system damages in Pennsylvania as a result of Tropical Storm Agnes were extensive. Many railroads suffered severe financial losses and one, The Erie and Lakawanna, was forced into bankruptcy. Over 4,400 freight cars, 1,400 locomotives and hundreds of miles of track were lost in the Agnes flooding. Damage to the already bankrupt Penn Central Transportation Company alone was in excess of $19 million. For these losses, railroads were not eligible for federal assistance and long-range recovery plans will consider ways to alleviate the financial problems of the railroads.

Damage to the federally-aided and state highway system was massive. Over 370 miles of highway and 245 state owned bridges were damaged, with 175 of these bridges being completely destroyed. Most of this damage was repaired with federal assistance, either under the Federal Highway Administration's program for Emergency Relief of Federal-Aid Highways or under the Office of Emergency Preparedness (OEP) payments for repair and restoration of public facilities. Most county and municipal roads and bridges were also repaired under the OEP Public Law 91-606 Disaster Assistance.

Even though most transportation damage has been repaired, a need will continue to exist for better and new transportation facilities to support the industrial development and community renewal activities anticipated as part of the long-range flood recovery. Aid to municipal transit companies to continue operation of special transportation services for displaced families in temporary housing will, no doubt, be required for some time to come. The transportation needs of the labor force will become more of a problem as industrial and commercial development proceeds.

Possible Sources of Financial Support:

Federal Programs

11.300 Economic Development-Grants and Loans for Public Works and Development Facilities (DOC (EDA)

11.304 Economic Development-Public Works Impact Projects, DOC (EDA)

14.304 Public Facilities Loans (PFL), HUD (CD)

20.205 Highway Research, Planning and Construction (Federal-Aid Highway Program), DOT (FHWA)

20.212 Economic Growth Centers Development-Highways, DOT (FHWA)

20.213 Special Bridge Replacement, DOT (FHWA)

20.500 Urban Mass Transportation Capital Improvement Grants (Capital Grants), DOT (UMTA)

20.501 Urban Mass Transportation Capital Improvement Loans (Capital Loan), DOT (UMTA)

23.001 Appalachian Regional Development (Appalachian Program), ARC

23.002 Appalachian Supplements to Federal Grant-in-Aid (Supplemental Grants), ARC

23.003 Appalachian Development Highway System (Appalachian Corridors), ARC

23.008 Appalachian Local Access Roads, ARC

State Programs

301 Appalachia Program Aids

302 Community Facilities Grants (Harness Racing Bill)

303 Site Development Grants

402 Municipal Consulting Services

408 Central Business District Planning Financial Assistance

416 Comprehensive Planning Assistance Program

418 State Planning Assistance Program

1602 Urban Mass Transportation Financial Assistance for Studies, Analysis, Planning and Development of Programs

1603 Urban Mass Transportation Financial Assistance for Research, Development and Demonstration Projects

1604 Urban Mass Transportation Financial Assistance for Advertising, Promotion and Stimulation

1605 Urban Mass Transportation Financial Assistance for Facilities and Equipment

1606 Urban Mass Transportation Financial Assistance for Sustaining Service

1607 County Fuels Tax Allocations

1608 Municipal Fuels Tax Allocations

1610 Highway Affairs Technical Assistance

1614 TOPICS

1616 Transportation Planning Assistance

PROBLEMS OF THE ELDERLY

The severity of the Tropical Storm Agnes disaster aggravated many of the problems (nutrition, housing, medical care, mental health,

transportation and recreational opportunity) normally associated with the aged population. Although many forms of financial, medical and other assistance were made available to the elderly victims of Agnes, many of these individuals have little hope of returning to the life-style that they had before the disaster. Older individuals who lost their possessions and homes will experience difficulties in repaying Small Business Administration loans, even at the 1 percent rate, due to their fixed income levels. Problems of the elderly are particularly severe in the Northeastern, Susquehanna and Capital regions.

The anxieties and tensions created by relocation, loss of possessions and physical well-being, and financial burdens tend to accelerate the aging process resulting in further stresses which lead to physical and mental disease. While there is little hard evidence of increased mental and physical health problems in the nine-month period immediately following the Agnes disaster, as late as January 1973, a group of 50 paraprofessionals was still actively helping elderly flood victims in Wilkes-Barre to cope with the physical and mental problems of returning to normal[6]. In the Wyoming Valley communities alone, over 25,000 elderly people were affected by the flood[7]. In several of the other communities devastated by Agnes, the areas affected were those inhabited by the aged.

The long-range flood recovery effort will consider the needs of the elderly primarily through existing federal and state programs. Programs to assist the elderly through the accelerated construction of nursing homes, low cost housing and establishment of mental health and counseling services will also be undertaken. Transportation services for the elderly will be developed.

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[6] Newsweek, January 29, 1973.

[7] Wilkes-Barre Times Leader, September 17, 1972.

Possible Sources of Financial Support:

Federal Programs

13.220 Health Facilities Construction - Grants (Hill-Burton Program), DHEW (HSMHA)

13.237 Mental Health - Hospital Improvement Grants (HIP), DHEW (HSMHA)

13.238 Mental Health - Hospital Staff Development Grants, DHEW (HSMHA)

13.240 Mental Health - Community Mental Health Centers, DHEW (HSMHA)

13.248 Disease Control - Nutrition, DHEW (HSMHA)

13.253 Health Facilities Construction - Loans and Loan Guarantees (Hill-Burton), DHEW (HSMHA)

13.714 Medical Assistance Program (Medicaid (Title XIX)), DHEW (SRS)

13.754 Public Assistance - Social Services, DHEW (SRS)

13.756 Aging - Special Support Projects (Aging Programs), DHEW (SRS)

13.757 Comprehensive Social and Rehabilitation Research (SRS Research), DHEW (SRS)

13.758 Comprehensive Social and Rehabilitation Training (Manpower Development and Training), DHEW (SRS)

13.761 Public Assistance - Maintenance Assistance (State Aid), DHEW (SRS)

13.800 Health Insurance for the Aged - Hospital Insurance (Medicare), DHEW (SSA)

13.801 Health Insurance for the Aged - Supplementary Medical Insurance (Medicare), DHEW (SSA)

13.803 Social Security - Retirement Insurance, DHEW (SSA)

13.804 Social Security - Special Benefits for Persons Aged 72 and Over, DHEW (SSA)

13.805 Social Security - Survivors Insurance, DHEW (SSA)

14.103 Interest Reduction Payments - Rental and Cooperative Housing for Lower Income Families (236), HUD (FHA)

14.129 Mortgage Insurance - Nursing Homes and Intermediate Care Facilities (232), HUD (FHA)

14.138 Mortgage Insurance - Rental Housing for the Elderly (231), HUD (FHA)

14.146 Public Housing - Acquisition (with or without Rehabilitation) and Construction, HUD (FHA)

14.148 Public Housing - Leased (Section 23 and Section 10(c)), HUD (FHA)

17.223 Operation Mainstream, DOL (MA)

23.005 Appalachian Housing Fund (Appalachian Housing Assistance), ARC

23.014 Appalachian Housing Site Development, ARC

49.003 Comprehensive Health Services, OEO

49.010 Older Persons Opportunities and Services (SOS), OEO

57.001 Social Insurance for Railroad Workers, RRB

64.005 Grants to States for Construction of State Nursing Home Care Facilities, VA

64.014 Veterans State Domiciliary Care, VA

64.015 Veterans State Nursing Home Care, VA

64.017 Grants to States for Remodeling of State Home Hospital/ Domiciliary Facilities, VA

72.001 Foster Grandparents, ACTION

72.002 Retired Senior Volunteers (RSVP), ACTION

State Programs

301 Appalachia Program Aids

400 Pennsylvania Urban Assistance Act of 1969

402 Municipal Consulting Services

406 Informational Services to Local Governments

407 Anti-poverty Advisory Service

411 Housing Assistance

414 Parks and Recreation Technical Services

415 500 Million Dollar Conservation Bond Issue Program

500 Recreation Program Technical Assistance

602 Project 70 Payments-in-Lieu-of-Taxes

809 Local Health Administration - General Technical Assistance

810 Public Health Nursing Technical Assistance

815 Accident Prevention and Home Safety

1302 Improvement and Demonstration Grants - Services for the Aging

1308 Mentally Disabled - Community Services

1309 Hospital and Medical Facilities Survey and Construction - Hill-Burton Program (Federal)

1310 Public Nursing Home Care

MINE RELATED PROBLEMS

The heavy rains and flooding associated with Tropical Storm Agnes aggravated many of the problems associated with past mining activities in the Commonwealth, particularly in the Anthracite regions of Northeastern Pennsylvania. Inundation of subsurface mines and ground water recharge increased the risk of surface subsidence and created additional mine drainage outflows. The subsidence has also opened cracks and ventilation in the collapsed areas leading to increased risk of mine fires. The heavy rains led to further instabilities in many coal mine refuse banks and created additional acid runoff.

The Appalachian Regional Commission, through a supplemental appropriation,is undertaking additional research and financial assistance to the Commonwealth as Section 205 projects to deal with control of surface subsidence and related mine impacts. The Commonwealth will reorient its mine related environmental improvement projects to cope with the problems exacerbated by Agnes. Long-range flood plans will consider surface subsidence vulnerability and risk in the planning of housing, industrial and flood protection projects. Mine fire control and strip mine reclamation will be included in the long-range planning. Use of strip pits for solid waste disposal has already begun on a limited basis and will be further explored.

Possible Sources of Financial Support:

Federal Programs

15.301 Control of Fires in Inactive Coal Deposits, DOI (BOM)

23.010 Appalachian Mine Area Restoration, ARC

66.300 Solid Waste Demonstration and Resource Recovery System Grants, EPA (OSWMP)

66.301 Solid Waste Planning Grants, EPA (OSWMP)

66.401 Water Pollution Control - Comprehensive Basin Planning Grants, EPA (OWP)

66.405 Water Pollution Control - Research, Development, Demonstration, EPA (OWP)

State Programs

301 Appalachia Program Aids

803 Solid Waste Disposal Act Demonstration Grants

818 Solid Waste Management - State and Federal Planning and Demonstration Grants

1100 Mining Area Restoration Commonwealth Projects and Federal - State Appalachia Projects

1101 Mine, Land and Minewater Reclamation - Operation Scarlift

SECTION III

DISASTER URBAN RENEWAL

INTRODUCTION

Background

As of April 9, 1973, Pennsylvania had received more than 400 million dollars of Federal Aid in support of the Commonwealth's effort to recover from Agnes.[8] In addition, the Federal Government has committed itself to providing Pennsylvania more than 900 million dollars for urban renewal, 400 million dollars in grants and 533 million dollars in loans. Survey and Planning Applications for 80 Disaster Urban Renewal Projects were received and 60 were approved, either fully or partially, by HUD. Survey and planning studies are presently being conducted for those approved projects and are scheduled for completion by June. Based upon a review of these studies, HUD will release funds to begin the projects.

The purpose of this section is to document the result of a study conducted by MITRE to evaluate the 80 projects and select those which maximize the value of urban renewal to the Commonwealth. The evaluation is based upon data provided in the Survey and Planning Applications, value judgements provided by Office of State Planning and Development (OSPD) personnel, and the Structured Value Analysis (SVA) procedure developed by MITRE.

The purpose of the evaluation is to provide OSPD with information to support discussions with HUD on the selection criteria used, to identify urban renewal needs, and to rank urban renewal projects for the Long-Range Flood Recovery Plan. In addition, it is hoped that

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[8] Based upon data obtained from Mr. Charles Griffith, Federal Program Coordinator, Office of the Budget, Commonwealth of Pennsylvania.

the analysis presented will demonstrate the usefulness of SVA as a means of developing program mixes to satisfy other flood recovery needs which will be identified as data become available.

Originally, MITRE had been tasked by OSPD to use SVA to develop a mix of programs to satisfy all long-range flood recovery needs. However, as MITRE's effort to define a data base and to identify data sources progressed[9] it became apparent that sufficient data would not be available to perform the task as defined. After a review of the available information, it was decided to concentrate on evaluating and developing a program mix for only the urban renewal projects.

Disaster Urban Renewal

The purpose of Disaster Urban Renewal is to provide funds to cities to permit redevelopment authorities to purchase land and buildings in devastated areas, clear the land, and replace or repair utilities and streets. Disaster Urban Renewal, as it is being applied in Pennsylvania, differs from normal urban renewal projects in that it does not generally use project funds to rehabilitate housing. Rehabilitation funds are being provided to the homeowners through SBA loans. Limited rehabilitation was accomplished through the Corps of Engineers Mini-Repair Program.

In general, urban renewal projects must be undertaken in slums, blighted areas or deteriorating areas. These projects, at least in part, are justified by the benefits produced by the projects. Rothenberg identified three classes of benefits[10]:

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[9] The results of the data base study are presented in Section V of this report.

[10] Rothenberg, Jerome, Economic Evaluations of Urban Renewal, Washington: Brookings Institute, 1967.

(a) The increase in the value of the land in the project area between acquisition and resale, i.e., internalization of externalities,

(b) Increases in the values of land and property adjacent to the project area, and

(c) Reductions of slum-generated social costs.

Disaster Urban Renewal projects may also be evaluated, in part, using the benefits described above. However, the benefits, especially (b) and (c), must be viewed in the context of what would happen if the Disaster Urban Renewal Project were not funded. The benefits are really the losses and extra costs which are eliminated as a result of the projects.

However, the use of the above approach in evaluating Disaster Urban Renewal has two serious drawbacks. First, decisions on projects to be funded have to be made in a very short time; thereby limiting the time available for data collection and analysis. Second, the major benefits derived by Disaster Urban Renewal projects are not included in the procedure proposed by Rothenberg. These include:

(a) Payment of pre-flood values to owners of those properties damaged beyond repair,

(b) Re-establishment of the area as a viable community, thereby encouraging owners to rehabilitate and improve their properties,

(c) Reduction of the number of properties and therefore the value of non-floodproofed properties within the flood plain, thereby reducing the potential damage which would result from another storm of the magnitude of Agnes.

OSPD recently conducted a survey of local, county and regional organizations to identify flood recovery needs and priorities[11]. The results of this survey indicated that housing was one of the major recovery needs of the Commonwealth and ranked second in priority only to flood control problems and needs. Two of the three benefits presented in the preceding paragraph address the housing needs. The first benefit, payment of pre-flood values provides those individuals with the financial means to establish themselves in other housing. This in turn will provide the economic incentive to increase the housing stock through normal free market operations. The second benefit, re-establishment of the area as a viable community, encourages the rehabilitation of repairable housing. This in turn results in a maximum increase in available housing in the shortest period of time. These two benefits provide the basis for the analysis presented in this paper.

The third benefit, reduction of non-floodproofed property values in the flood plain, is important, especially in the long run. However, because redevelopment plans are not available for the Disaster Urban Renewal projects, it is impossible to determine the value of this benefit except in terms of the opportunity created by the Disaster Urban Renewal projects to reduce potential damage of future floods.

Problem Statement

On 10 July 1972 Governor Shapp issued an eight point program for Federal Disaster Assistance to Pennsylvania. In this program Governor Shapp requested $250 million of additional urban renewal funds. HUD eventually approved $400 million for urban renewal; however,

[11] Questionnaire to Determine Program Effectiveness, Needs, and Priorities for Flood Recovery, Office of State Planning and Development, Executive Office, Commonwealth of Pennsylvania, Harrisburg, Pennsylvania, March 1973.

$380 million was eventually earmarked for disaster urban renewal projects.[12] As a result of the availability of these funds, HUD received 80 Survey and Planning Applications requesting federal grants of more than $600 million.

Because the requests for Federal Disaster Urban Renewal grants were larger than the funds available, an allocation procedure was developed by HUD[13]. Application of this procedure resulted in 18 projects valued at $54 million being rejected. In addition 54 of the 62 approved projects were reduced in size and scope from that requested in their applications.

In developing the Long-Range Flood Recovery Plan, the problem faced by OSPD is two-fold. First, OSPD must identify the degree to which those projects which were funded satisfy the flood recovery needs of the state. This means that the funded projects must be evaluated in the context of the overall state goals and objectives as reflected in value judgements specified by OSPD personnel. Second, OSPD must identify unmet needs, as reflected in unfunded or partially funded projects, and rank these projects in an order which reflects their value or importance in the context of state goals and objectives.

A solution to the first problem would provide a basis for OSPD inputs into future Disaster Urban Renewal funding decisions. Since it appears that all of the major decisions on the allocation of the Disaster Urban Renewal funds have been made, the impact of an OSPD input may be limited. However, it could be important in that it can be used as a vehicle for communicating OSPD's opinions to HUD and

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[12] According to a Pennsylvania Department of Community Affairs list of approved projects, dated May 30, 1973, $20 million of the $400 million was earmarked for (1) Interim Assistance, (2) Reading (Riverfront) and (3) Chester City (Eyre Park).

[13] The details of this procedure are not known, but conversations with federal and state personnel indicate that it was informal.

the Pennsylvania Department of Community Affairs (DCA) and would provide a valuable input into any changes in funding decisions which may arise during the review of the Survey and Planning Studies. A solution to the second problem will provide a major input into the Long-Range Flood Recovery Plan.

ANALYTICAL TOOLS

Two analytical tools were used in the conduct of the analysis. The first, Structured Value Analysis (SVA), is a technique developed by MITRE that is based on decision theory to assist decision makers in evaluating alternatives and selecting those which have the greatest value. In the context of Disaster Urban Renewal Projects, SVA assists the decision makers by providing a structured procedure for determining, in the form of a project value indicator, the benefits or effectiveness of a project.

Pennsylvania has only $400 million in federal grants available to satisfy Disaster Urban Renewal Project requests of more than $600 million. Consequently, once project value and project cost are known, a technique is required for allocating limited funds among the various projects. Dynamic Programming, the second analytical tool, is used in this study to perform this function. Basically, Dynamic Programming selects the set of projects which, if funded, will maximize the value received for a given expenditure level.

Structured Value Analysis

Structured Value Analysis is a method of determining the benefits or values of projects in terms of an abstract set of value criteria. The basic comparison is straightforward and merely relates project parameters or characteristics to a measure of value specified by the decision makers. These relationships provide the basis for obtaining a numerical value for the project.

The analysis makes use of value judgements of experts, either individually or by consensus, to provide information and data where hard data is unavailable. As such, much of the information going into the model is subjective, but the results can be of high utility.

Four principles were held central in developing the SVA technique: it should be adaptive; be as simple to use as possible; yield repeatable conclusive results; and give a complete measure of the project, using expert value judgements as part of the evaluation process.

Adaptability is a necessary condition for a usable decision-assisting technique. Adaptability concerns the availability of information necessary to make decisions. In the early stages of planning, complete information is seldom, if ever, available; yet decisions must be made. Later, as the planning progresses, additional information is obtained. Also, the number of candidate projects being supported is progressively reduced as the planning process progresses. Therefore the SVA technique was designed to adapt to any stage of the planning process and to be flexible enough so that as additional data become available, they can easily be incorporated into the analysis.

Simplicity is the essence of reliability and understanding. If an error occurs in the analysis it should be easily found and corrected. Therefore, each part of the SVA technique is designed to be visible and the interrelationship of the parts is relatively uncomplicated. Since it was felt that SVA would be of value to decision makers only if easily understandable, every attempt was made to develop an approach based on simple mathematical relationships and logic. It is vital that the basis for the decision be simple to explain to all interested parties.

The decision-assisting technique must be conclusive if real differences among the projects exist. The results must be sensitive

to those characteristics of the projects which are of greatest importance in order to yield conclusive results. Further, the results must be repeatable. Therefore, SVA was structured to rely on survey measurements to the maximum extent possible. It should be recognized, however, that it may not be possible to get detailed survey measurements during the early stages of the planning process. The urgency of beginning the Disaster Urban Renewal projects as soon as possible precluded taking the time to collect the needed data. Therefore, the SVA approach includes a consideration of the uncertainty associated with estimates. The decision maker must know what these uncertainties are and how they could affect the decision.

Finally, the technique must be complete. The obvious measurable characteristics of the proposed projects must be considered. However, there are important factors of value judgement which must be considered in the absence of objective criteria. The SVA technique was created specifically to utilize these subjective criteria effectively in order to make the technique complete.

The objective of SVA is to make maximum use of as much information as is available about the projects. Much of this information is contained only in the experience of experts. In some cases this information, often consisting of unstructured or perhaps biased ideas, is the only information available. Structured Value Analysis seeks to extract this information, check it for validity and/or utility in a manner which allows quantification and manipulation. In the absence of objective criteria, the maximum information imbedded in subjective criteria must be utilized effectively. Critical areas are identified by Structured Value Analysis and indicate where further gathering of objective information would be most effective. The method is of high utility for decision making. It must be stressed, however, that SVA is a <u>tool</u> for decision making, not a decision maker in itself.

Essentially, Structured Value Analysis is a procedure which separates a complex decision process into a set of relatively simple, but interrelated, decisions. Each of these simple decisions is quantified and then combined, according to rules established by the decision maker, to arrive at a single measure of project value. The steps for performing a structured value analysis are presented below.

Step 1: Identify Parameters

Parameters are the basic project attributes or variables. They represent the kind of information needed to describe and adequately evaluate the projects under study. Any parameter which is so critical that an unacceptable performance of it would justify complete rejection of the project is designated as a factor. All other parameters are terms. A factor is a parameter related to other parameters by a multiplicative relationship. Terms are parameters related to other parameters by additive relationships.

Step 2: Establish Measurement Scales for Parameters

For each parameter, establish a range over which the parameter is to be quanitified and the allowable increments within the range limits.

Step 3: Establish Value Functions

Next, determine the value function for each parameter. Value functions relate points on the parameter measurement scale to points on an arbitrary value scale which ranges from 0 to 1. Unity represents the maximum value which may be obtained from a parameter. Similarly, zero represents the minimum value which may be obtained from a parameter. The development of these curves is based on information which falls into three categories:

(a) No information - use best guess and/or linear relationship

(b) Biased information - (i.e., subjective) alter the limits and shape of the curves by using expert opinions

(c) Analytical Information - (exact relationship is known) use an analytic function.

Step 4: Establish Weights

In order to determine the relative importance of the parameters, a weight is established for each parameter. The relative importance of the parameters is usually a judgement expressing value to the user.

Step 5: Calculate Structured Value

The value functions, weights, and mathematical rules for combining the parameter values are used to determine the project's Structured Value for each set of parameter data. Since the projects being considered for Disaster Urban Renewal can be varied in size and scope, each project must be considered as a set of mutually exclusive alternatives, with each alternative having a different cost and Structured Value. The output of this step is a value versus cost curve for each project. These curves then provide the input data required for the second part of the analysis, i.e., the resource allocation as determined by the Dynamic Programming Model.

Step 6: Sensitivity Analysis

The final step in the SVA is to conduct a sensitivity analysis. The purpose of this step is two-fold. First, it provides the decision maker with an analysis of the sensitivity of each project's value to the data provided for each project. Second, it provides a basis for the decision maker to make a critical evaluation of the value curves and weights assigned in steps 3 and 4.

A listing of the SVA computer program and a description of how to use the program is presented in Appendix B.

Dynamic Programming

Dynamic Programming is a computation technique useful in solving certain types of non-linear optimization problems. The selection of

the level at which to fund each Disaster Urban Renewal project in order to maximize the total value received by the Commonwealth is a non-linear problem that can readily be solved by the use of dynamic programming.

To solve this problem, dynamic programming requires only that the allowable funding levels and the value obtainable from each funding level be input for each project. The dynamic program technique will then select the level at which to fund each project to maximize the value for a given budget constraint.

For each project in this analysis, nine allowable funding levels are used. The funding levels range, in steps of ten percent, from 20 percent to 100 percent of the total funds requested for each project. A structured value is calculated for each funding level for input to the dynamic programming model. With this data as input, the dynamic programming technique selects the optimal funding level for each project for several budget levels. Without dynamic programming, determining a solution to the problem would require the evaluation of an almost infinite number of possible combinations of projects. Even with the use of modern high speed computers, it is impossible to determine the solution to the problem using a total enumeration approach. Dynamic programming, however, is a technique that decomposes an N-dimensional problem into N single-dimensional problems. As a result, the number of combinations which must be considered is drastically reduced, thereby permitting a solution to be obtained at a reasonable cost with the aid of a computer.

For the reader who is interested, a detailed description of dynamic programming is presented in Appendix C. In addition, Appendix C contains a listing of the computer program and a description of how to use the program.

PROJECT AND SVA DATA

Project Data

A review of the procedure required to apply for Disaster Urban Renewal funds was conducted to determine the data that are available. Since the purpose of the study is to select from among all applications for Disaster Urban Renewal the set of projects which maximizes the value of Disaster Urban Renewal to the Commonwealth, the data base must contain data from all applicants. Based upon the review of the application procedure and the data associated with the procedure, only one data base appeared satisfactory. This data base consists of the HUD Survey and Planning Applications. Data derived from the actual survey and planning studies, although more comprehensive, was not complete. Only those Survey and Planning Applications which were approved resulted in survey and planning studies. The applications which were disapproved, of course, did not result in a survey and planning study.

Since the analysis was conducted using only data contained in survey and planning applications (HUD forms 6100 and 6101C) the scope of the analysis was limited. Additional data would have been desirable; however, due to time and cost constraints, any effort to collect these data would have been infeasible.

One reason for using the survey and planning applications as a data base for the study was that it was expected the data could be collected easily from the HUD regional office files. This turned out to be incorrect. Although most of the data were available from HUD, additional effort was required to complete the data base because several of the applications were not on file, and numerous applications were not complete.[14]

[14] Incomplete data was to be expected since many of the applications were filed shortly after the disaster, too soon to conduct the surveys required.

As a result, completion of the data base required contacts with the individual applicants and, in some cases, with the planning consultants used by the applicants. After completing the contacts, some data elements were still unavailable. In these few cases, namely Harrisburg (Cameron), Edwardsville, Luzerne, Plymouth Boro, Plymouth Twp, Shickshinny, Swoyersville, West Nanticoke, Tioga Boro, and Smithfield, values for the missing data were extrapolated using data that were available. The data for the 80 projects considered are given in Appendix D.

Data for Partially Funded Projects

As has been discussed, the dynamic programming routine requires that a value be input for each allowable funding level of every project. In order to determine this value, a Structured Value must be calculated for every funding level.

This requires that data be available to describe the Disaster Urban Renewal project that will be undertaken when only partial funding is available. Such data were not available for this analysis. Consequently, it was necessary to calculate these project data using the data from the total project as a base.

For this calculation it was assumed that in the case of partial funding, the Disaster Urban Renewal effort would be directed toward the most heavily damaged portion of the total project area. It was further assumed that such an area would be discernible by the fact that it contained most, if not all, of the destroyed buildings in the total project area.

Thus, for each funding level, the data describing the number of buildings destroyed were not altered. However, the rest of the total project data were reduced by an amount equivalent to the funding level. For example, when the funding level was 90 percent of the total, all data, except data on buildings destroyed, were reduced

to 90 percent of their magnitude in the total project. The data for buildings destroyed were not changed.

These data were then used to determine the structured value for each funding level.

SVA Data: Parameters, Parameter Categories and Value Functions

Using a set of "idealized" urban renewal parameters (see Appendix E) derived primarily from the HUD Urban Renewal Handbook and the data limitations as reflected in the survey and planning applications, MITRE developed a set of 18 feasible parameters. These parameters were reviewed by OSPD personnel. In accordance with guidance provided by OSPD, the set of parameters was modified, and 16 of the parameters were grouped into seven categories. The remaining two parameters were classified as critical parameters and, therefore, were introduced into the analysis as factors (multiplicative parameters).

With this modified set of parameters and categories as a framework, a meeting was held with five members of the OSPD staff to develop weights for both the categories and the parameters. The process began with the parameters in the first category and was repeated for the parameters in each of the remaining six categories. After the parameter weights were determined, the process was repeated to develop weights for the seven categories.

The procedure followed in developing the parameter and category weights was as follows:

(a) The participants were instructed to assign weights to the group of parameters (or categories) such that the sum of weights is equal to 100 and the weights reflect their feelings of the relative value of each parameter (or category) to the category value (or project value).

(b) The weights were tabulated and averages for the participants were calculated. Any significant discrepancies were identified and discussed. After the discussion, the participants were permitted to modify their original set of weights. The average of the modified weights was then used as a basis for the SVA portion of the study.

For each of the 18 parameters, MITRE defined a value curve. Using these curves as a base, discussions were held with the participants. The basis for the shape of the curves was discussed, and modifications suggested by the participants were incorporated. The process of discussion and modification was continued until concurrence of a majority of the participants was reached.

The seven categories and the weights associated with each category are given in Table I. Three of the categories, 1, 2 and 4, are directly associated with housing and have a combined weight equal to 54 percent of the seven categories combined. This reflects the orientation of the participants toward using Disaster Urban Renewal projects to help in alleviating housing problems. This orientation is further reflected in the weight assigned to category 3, i.e., Non-Residential Buildings Lost. This category which has no relationship to housing was assigned the lowest weight of the seven categories.

The individual parameters, their weights and value curves are discussed below.

Housing Units Lost

This category consists of three parameters:

TABLE I
CATEGORY WEIGHTS

CATEGORY (i)	NAME	WEIGHT (x_i)
1	Housing Units Lost	14.6
2	Available Housing Units	18.6
3	Non-Residential Buildings Lost	9.6
4	Housing Requirements	20.8
5	Minorities	12.0
6	Seriousness of Flooding	13.2
7	Land Use	11.2
	Total	100.0

	Parameter (j)	Weight (w_j)
(a) Portion of dwelling units destroyed		
$\frac{\text{Dwelling units destroyed}}{\text{Dwelling units before flood}}$	1	26
(b) Portion of dwelling units to be demolished		
$\frac{\text{Dwelling units to be demolished}}{\text{Dwelling units before flood}}$	2	20
(c) Portion of dwelling units which are repairable		
$\frac{\text{Unusable but repairable dwelling units}}{\text{Dwelling units before flood}}$	3	54

The third parameter accounts for more than 50 percent of the total weight of this category. In effect, this reflects the fact that use of urban renewal funds to restore neighborhood viability is more important, if there are potentially usable houses available in the near term, than clearing the land and redeveloping the area. Redevelopment can take from five to ten years and does nothing to alleviate the short-term housing needs of the Commonwealth.

The value curves for these three parameters are presented in Figures 2 through 4. The horizontal axis represents the parameter data point, and the vertical axis gives the value point associated with each data point of the parameter. The bracketed numbers give the x and y coordinates, respectively, of each breakpoint of the value curve. The value point associated with parameter j of project k will be denoted by $v_{i,j,k}$. The subscript i refers to the category. For example, Figure 1 shows the value curve for the first parameter. The vertical axis gives the value point corresponding to each possible data point for the first parameter, the portion of dwelling units destroyed. If for project 3, the parameter data point is .05, the value point $v_{1,1,3}$ is equal to 1.0.

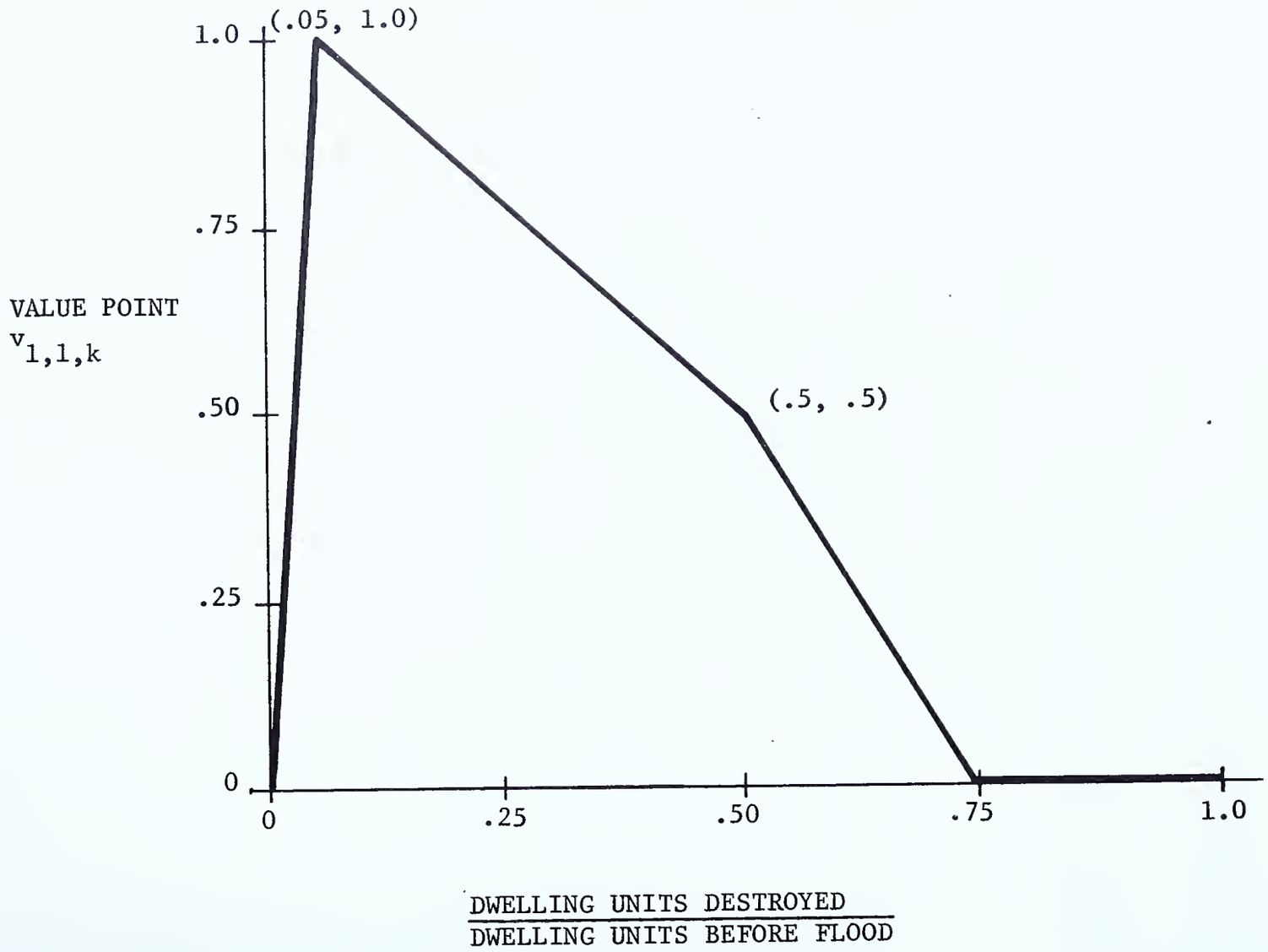

FIGURE 2
VALUE CURVE FOR PORTION OF DWELLING UNITS DESTROYED

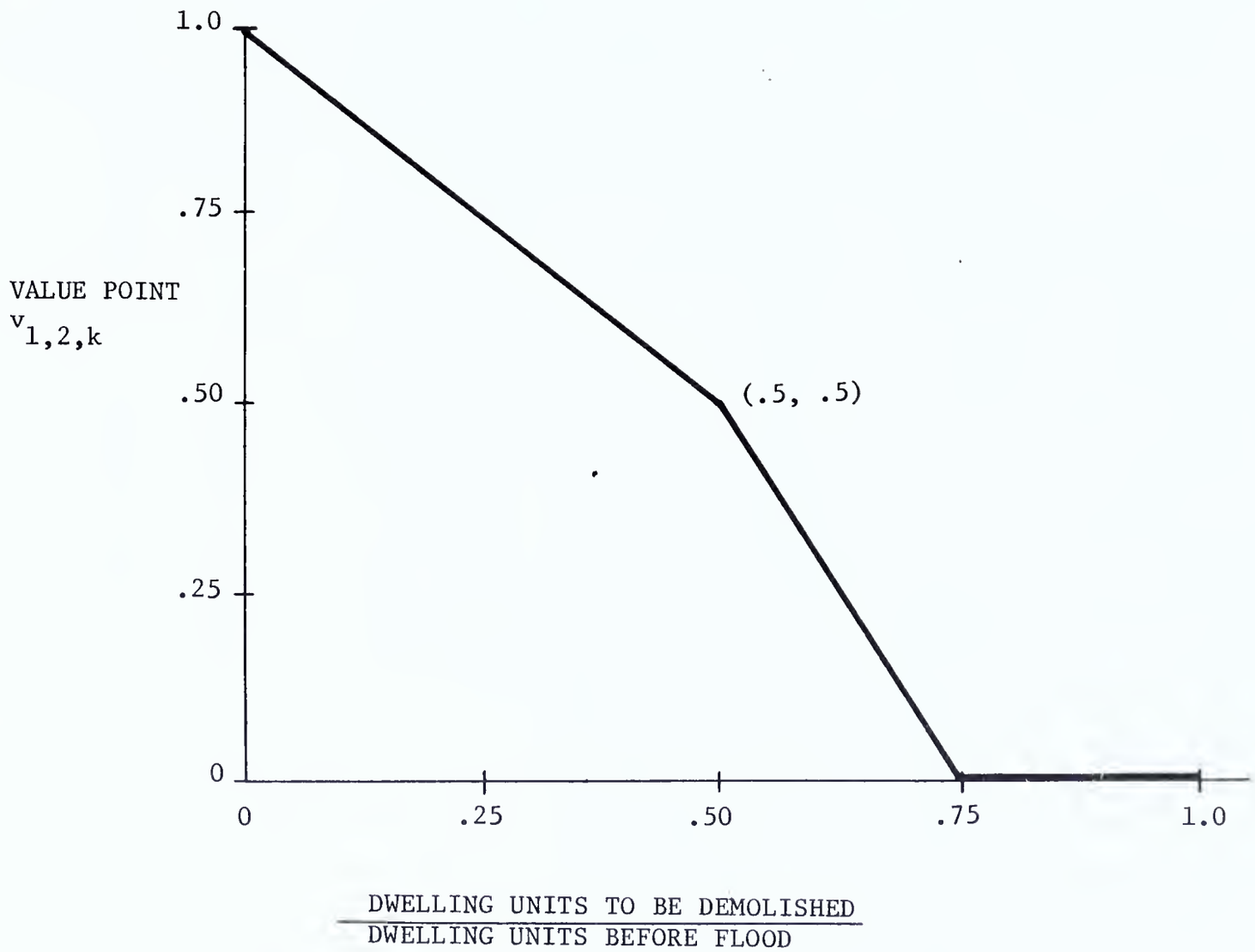

FIGURE 3
VALUE CURVE FOR PORTION OF DWELLING UNITS TO BE DEMOLISHED

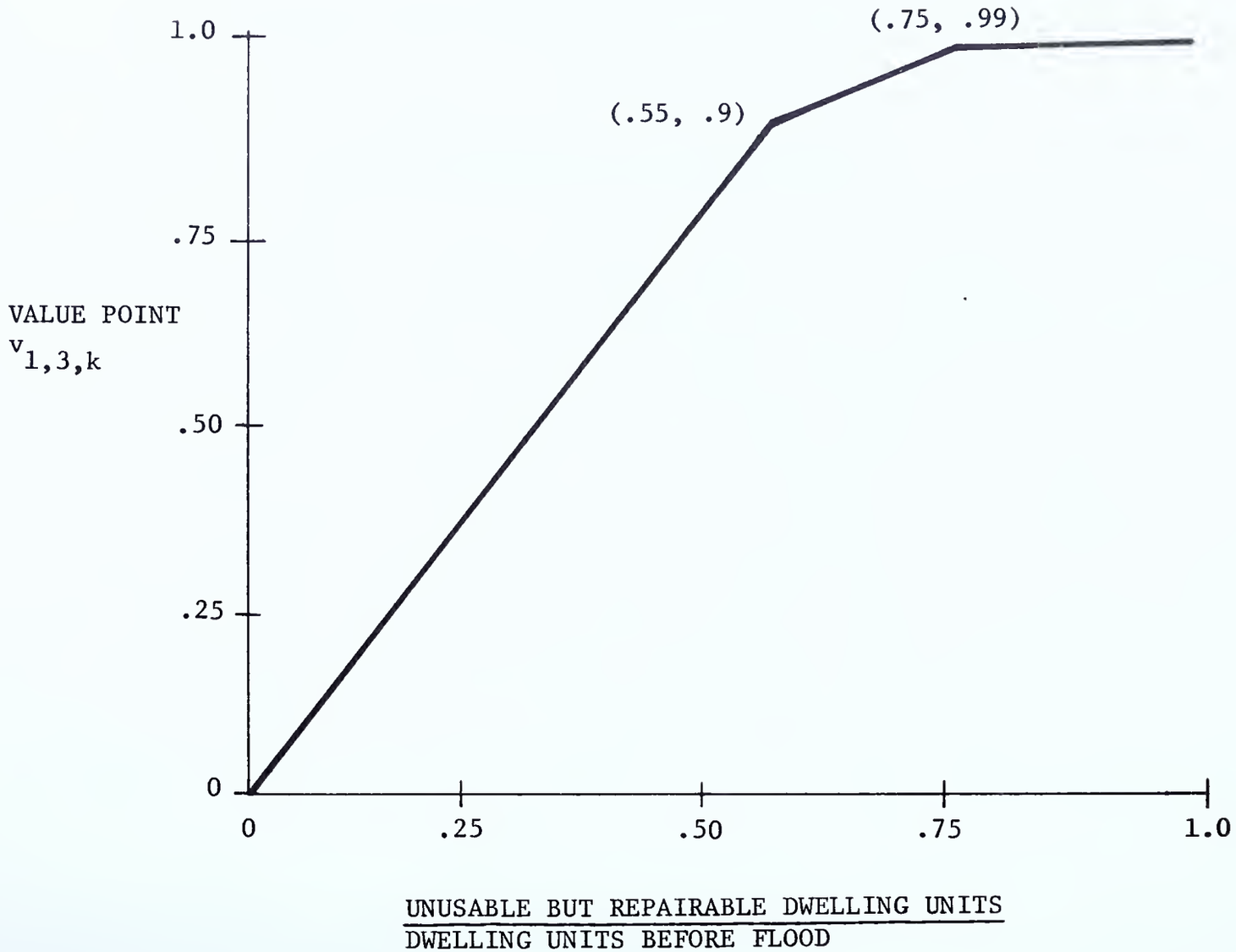

FIGURE 4
VALUE CURVE FOR PORTION OF DWELLING UNITS WHICH ARE REPAIRABLE

The value curve for the first parameter increases until the parameter becomes larger than .05, then the value curve decreases. The initial increase reflects the desirability of urban renewal in an area with a small portion of dwelling units destroyed. The value curves for the second parameter decrease as the parameter increases. The slopes of the value curves, like the weights, reflect the high value placed upon repairable houses in allocating urban renewal funds.

Available Housing Units

The category of Available Housing Units has only one parameter, the portion of dwelling units which are damaged but useable. This parameter is calculated as follows:

$$\frac{\text{Usable but damaged dwelling units}}{\text{Dwelling units before flood.}}$$

Since it is the only parameter in this category it has a weight w_4 of 100. The value curve for this parameter is given in Figure 5. As in the case of the first category, the shape of the value curve shows the importance of near-term housing, usable but damaged, as opposed to long-term housing.

Non-Residential Buildings Lost

This category consists of two parameters:

	Parameter (j)	Weight (w_j)
(a) Portion of non-residential buildings destroyed		
$\frac{\text{Non-residential buildings destroyed}}{\text{Non-residential buildings before flood}}$	5	34
(b) Portion of non-residential buildings damaged		
$\frac{\text{Non-residential buildings damaged}}{\text{Non-residential buildings before flood}}$	6	66

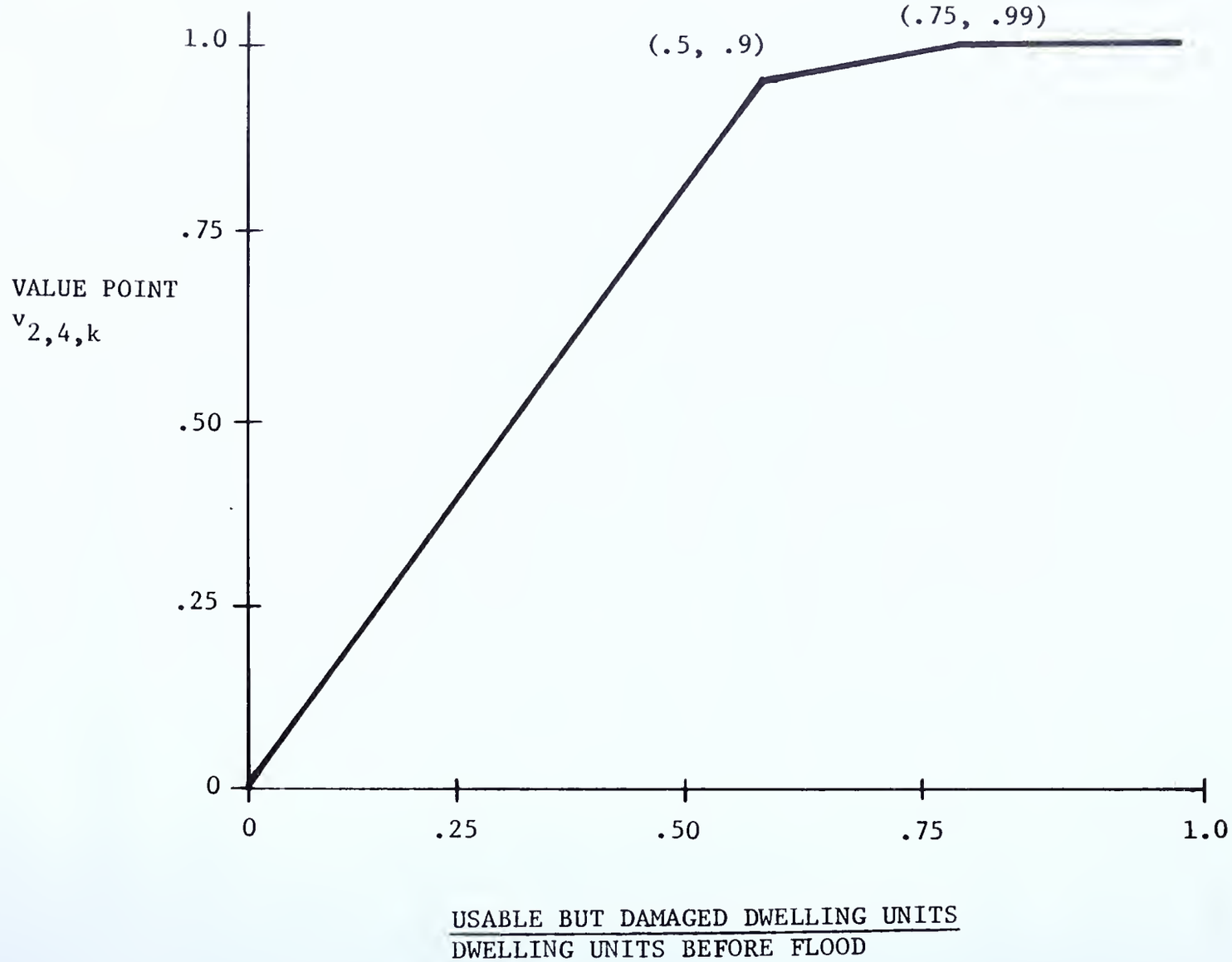

FIGURE 5
VALUE CURVE FOR PORTION OF DWELLING UNITS WHICH ARE DAMAGED BUT USABLE

The value curves for these two parameters are given in Figures 6 and 7. Both the weights and the value curves indicate the importance of damaged buildings over destroyed buildings in the overall value of a disaster urban renewal project. The damaged buildings parameter is given a weight twice as high as destroyed buildings. In addition, the value curve for the damaged buildings parameter increases as the parameter increases; whereas, the value curve decreases as the destroyed buildings parameter increases.

Housing Requirements

The Housing Requirements category is composed of two parameters:

	Parameter (j)	Weight (w_j)
(a) Usable dwelling units per family after the flood		
$\frac{\text{Usable dwelling units after flood}}{\text{Families in area after flood}}$	7	23.6
(b) Families after the flood per dwelling unit before flood		
$\frac{\text{Families in area after flood}}{\text{Dwelling units in area before flood}}$[15]	8	76.4

The value curves for these two parameters are given in Figures 8 and 9. Parameter 7 reflects the near-term housing needs and parameter 8 reflect the long-term needs to restore the heighborhood to its pre-flood condition.

[15] Dwelling units in area before flood is used to approximate the number of families in area before the flood. This variable was used because data on the number of families in area before the flood was not available.

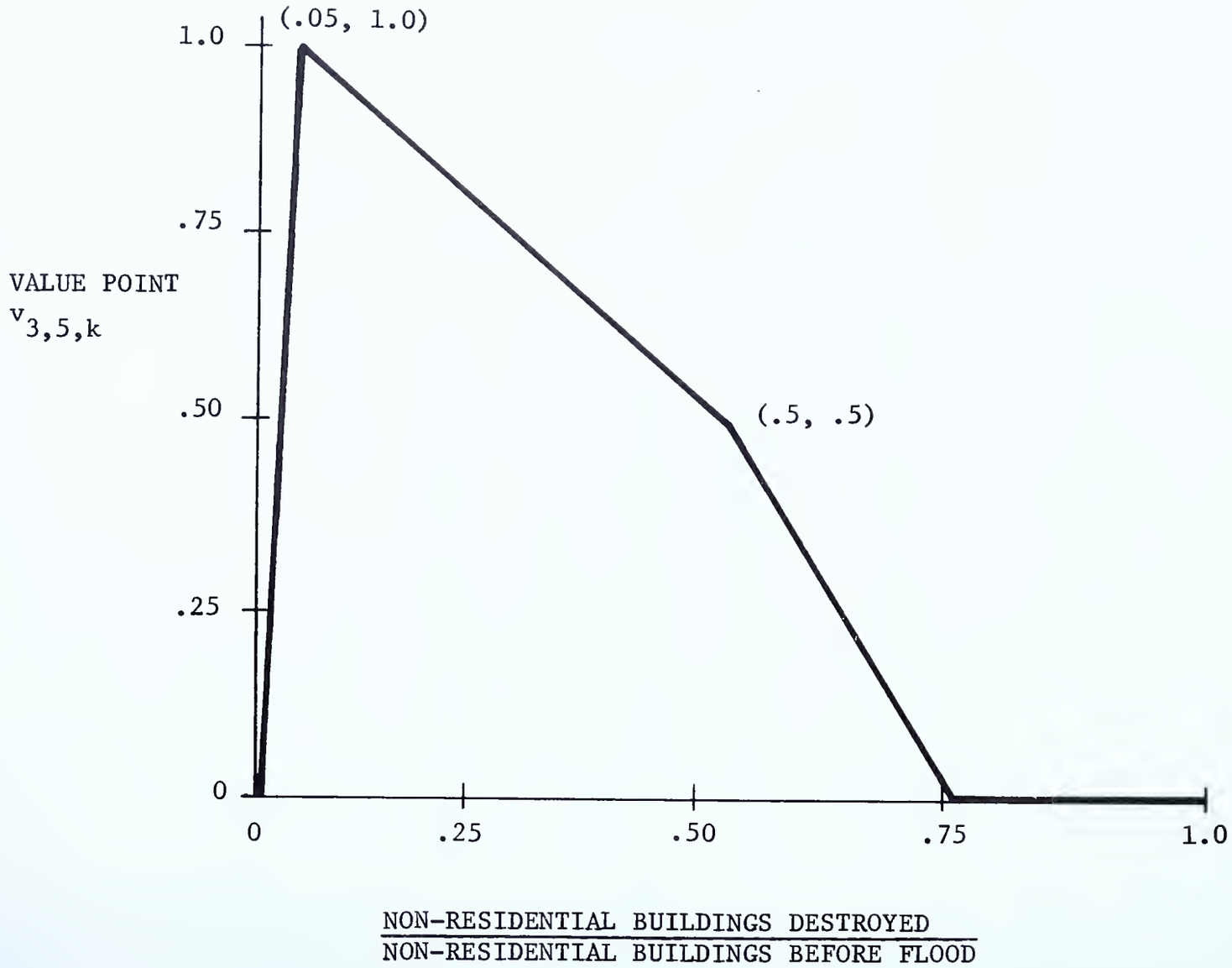

FIGURE 6
VALUE CURVE FOR PORTION OF NON-RESIDENTIAL BUILDINGS DESTROYED

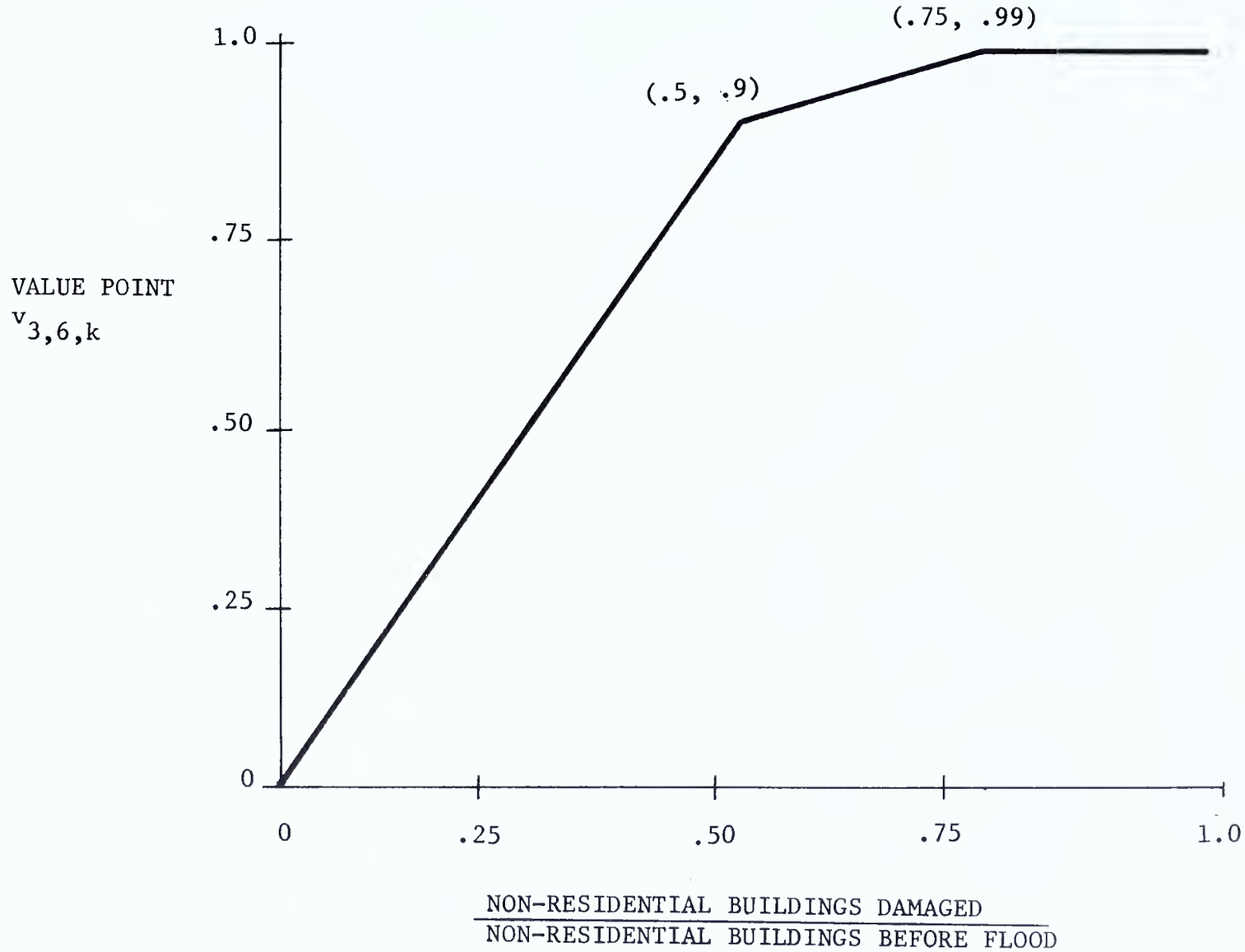

FIGURE 7
VALUE CURVE FOR PORTION OF NON-RESIDENTIAL BUILDINGS DAMAGED

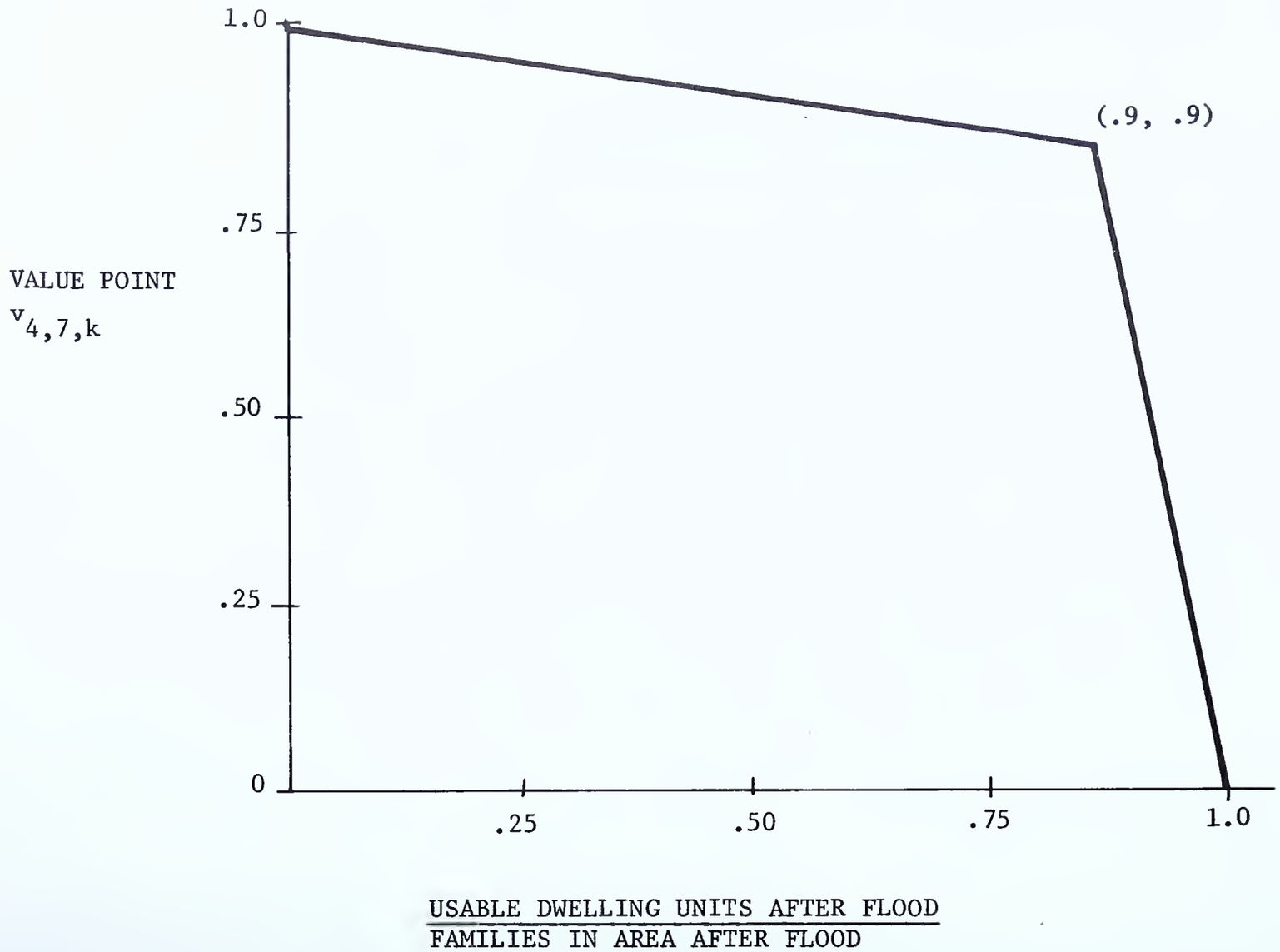

FIGURE 8
VALUE CURVE FOR USABLE DWELLING UNITS PER FAMILY AFTER FLOOD

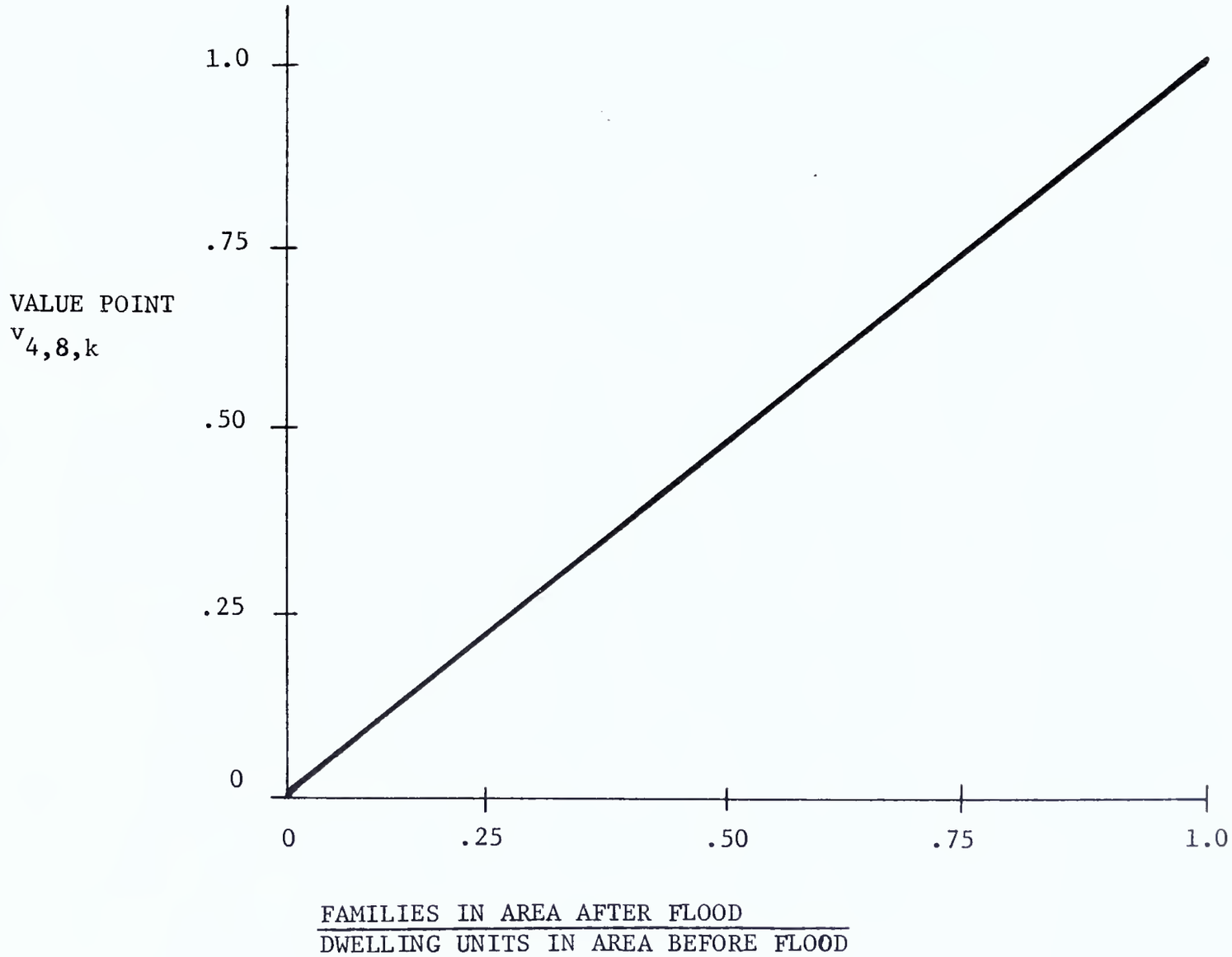

FIGURE 9
VALUE CURVE FOR FAMILIES AFTER FLOOD PER DWELLING UNIT BEFORE FLOOD

Minorities

This category contains a set of three parameters which reflect the effect of the urban renewal on minorities. The three parameters, their number and weight are given below:

	Parameter (j)	Weight (w_j)
(a) Portion of families which are minority in area after flood		
$\frac{\text{Minority families in area after flood}}{\text{Families in area after flood}}$	9	25
(b) Portion of usable but repairable dwelling units which are minority		
$\frac{\text{Unusable, repairable min.dwelling units}}{\text{Unusable, repairable dwelling units}}$	10	70
(c) Portion of usable dwelling units which are minority		
$\frac{\text{Usable minority dwelling units}}{\text{Usable dwelling units}}$	11	5

The value curves for these three parameters are given in Figures 10 through 12. The first two parameters, 9 and 10, account for 95 percent of the total weight of this category. The value curves for these two parameters are identical, increasing rapidly from a value of 0 to 1 as the parameter increases from 0 to .1. Above .1, the parameter's value remains at 1. These two parameters give added weight to those projects which affect minority groups.

The value curve for parameter 11 has the same initial slope as parameters 9 and 10. However, when the parameter becomes larger than .2, the parameter's value decreases until reaching 0 when the parameter reaches 1.

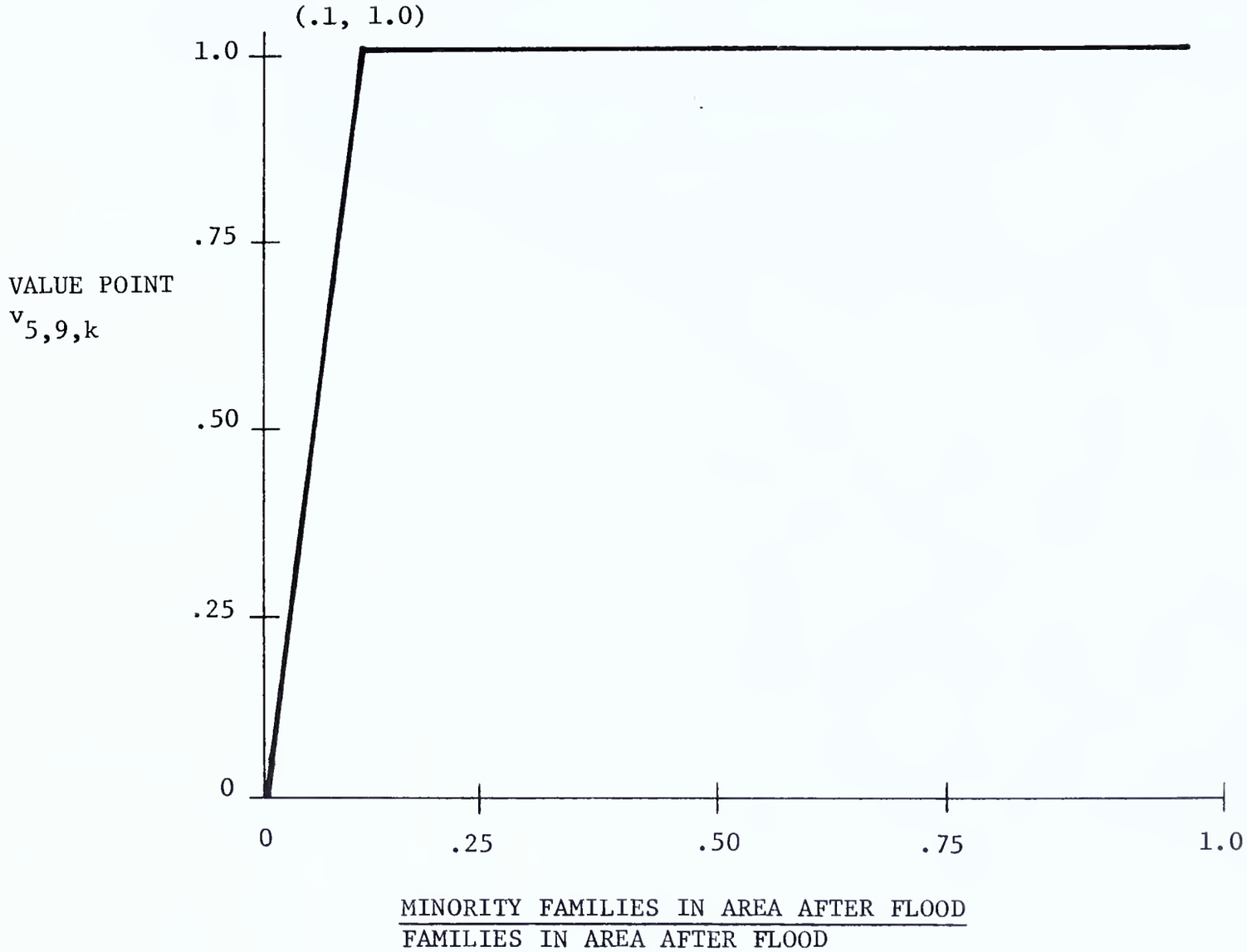

FIGURE 10
VALUE CURVE FOR PORTION OF FAMILIES WHICH ARE MINORITY IN AREA AFTER FLOOD

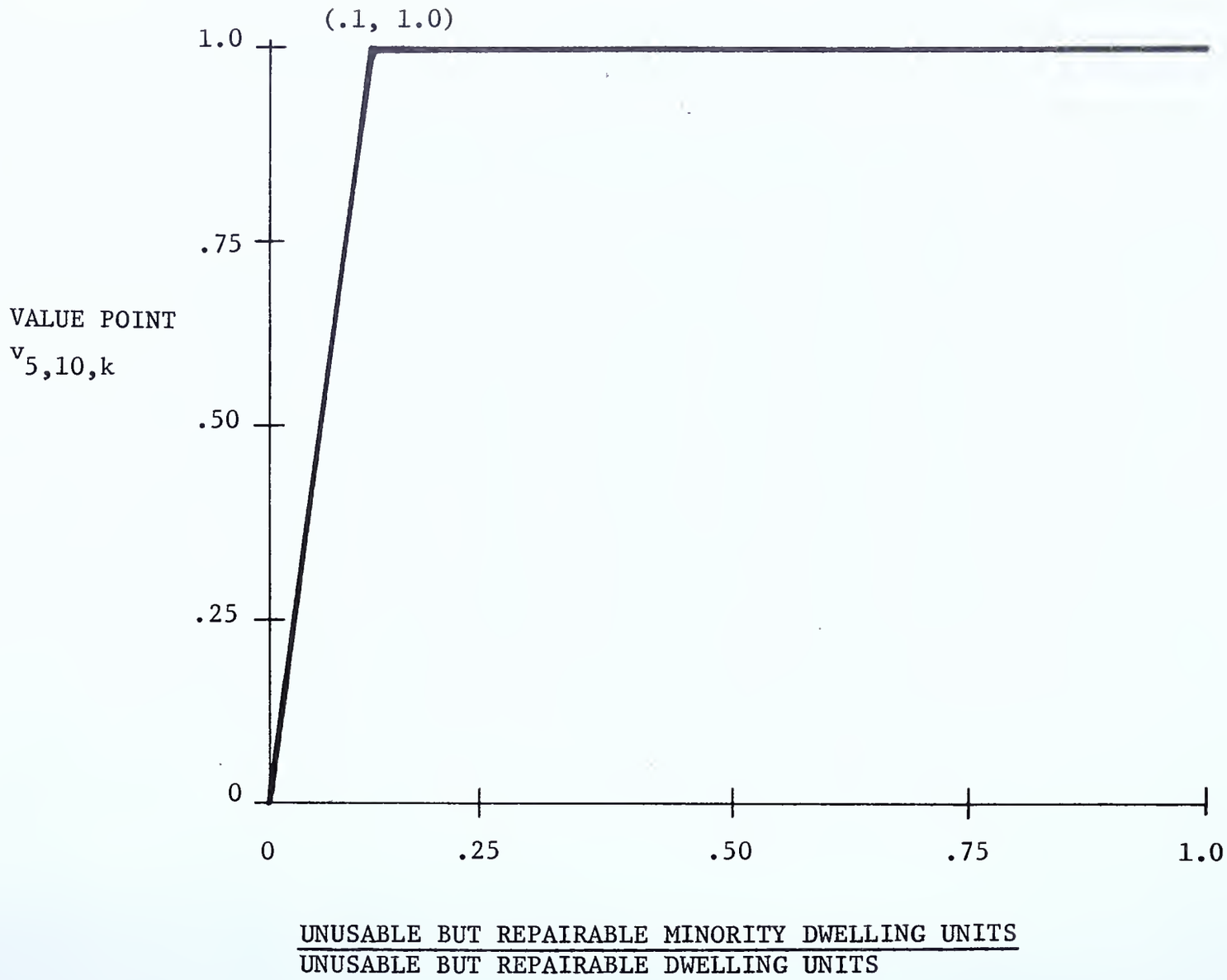

FIGURE 11
VALUE CURVE FOR PORTION OF UNUSABLE BUT REPAIRABLE MINORITY DWELLING UNITS

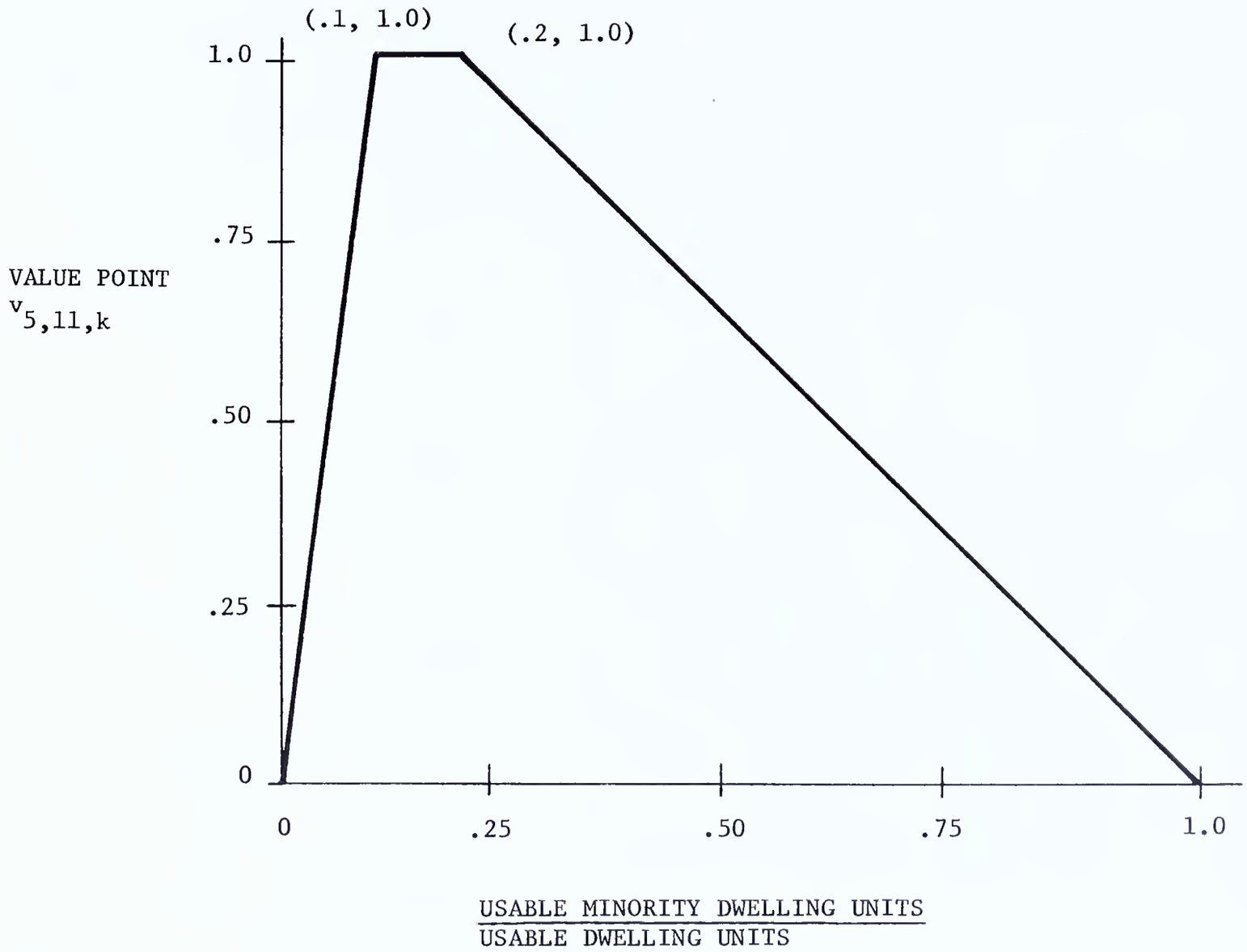

FIGURE 12
VALUE CURVE FOR PORTION OF USABLE MINORITY DWELLING UNITS

Seriousness of Flooding

The Seriousness of Flooding category consists of two parameters:

	Parameter (j)	Weight (w_j)
(a) Portion of buildings damaged or destroyed		
$\frac{\text{Buildings damaged or destroyed}}{\text{Buildings before flood}}$	12	54
(b) Portion of damaged residential buildings to be demolished		
$\frac{\text{Residential buildings to be demolished}}{\text{Residential buildings damaged}}$	13	46

The value curves for the parameters are given in Figures 13 and 14. The value curve for parameter 12 increases as the parameter increases indicating an increasing value, in terms of the seriousness of the flooding, as the percentage of buildings damaged or destroyed increases.

The value curve for parameter 13 decreases as the parameter increases reflecting a desire to give more value to projects where residential buildings can be repaired rather than demolished for redevelopment.

Land Use

There are three parameters associated with the category of Land Use. These parameters and their weights are given below.

	Parameter (j)	Weight (w_j)
(a) Pre-flood density of dwelling units		
$\frac{\text{Dwelling units before flood}}{\text{Residential acres before flood}}$	14	25

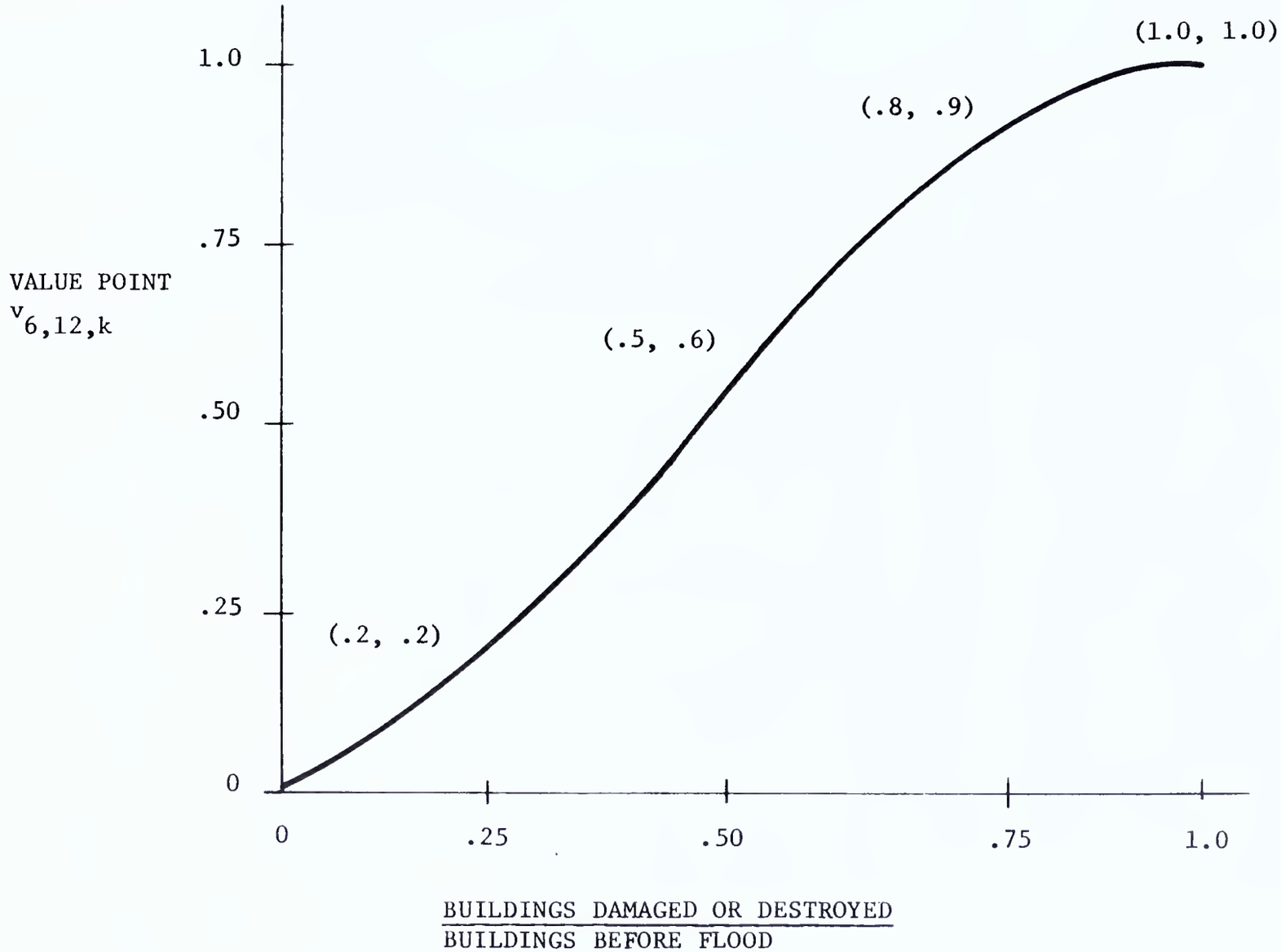

FIGURE 13
VALUE CURVE FOR PORTION OF BUILDINGS DAMAGED OR DESTROYED

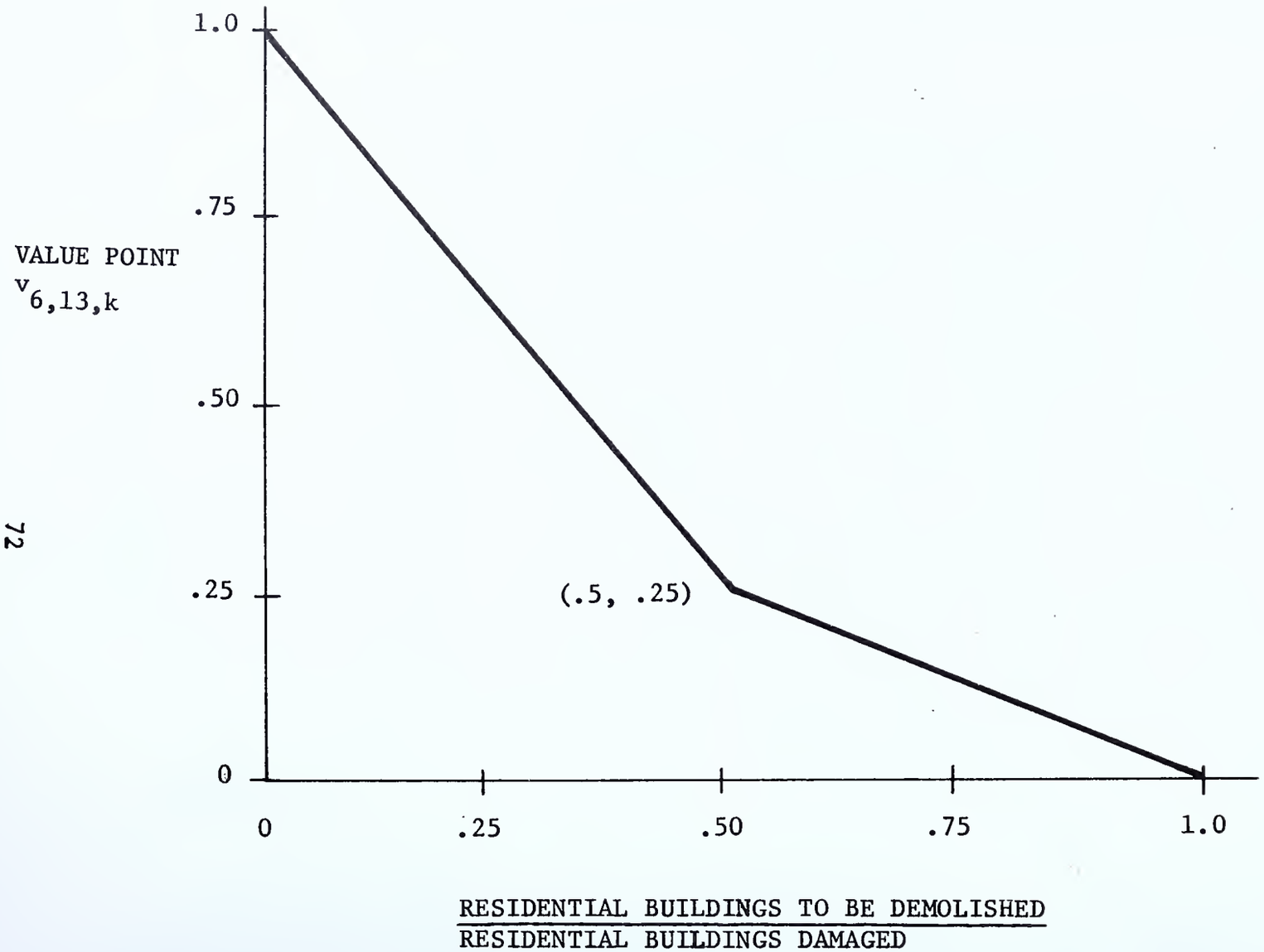

FIGURE 14
VALUE CURVE FOR PORTION OF DAMAGED RESIDENTIAL BUILDINGS TO BE DEMOLISHED

	Parameter (j)	Weight (w_j)
(b) Portion of area used for residential purposes		
$\frac{\text{Acres of residential land}}{\text{Total acres covered by project}}$	15	48
(c) Portion of area used for non-residential purposes		
$\frac{\text{Acres of non-residential land}}{\text{Total acres covered by project}}$	16	27

The value curves for the three parameters are given in Figures 15 through 17. The value curves for parameters 14 and 15 increase as the parameter increases. Parameter 14, Density of Dwelling Units, has a zero value if the density is less than five units per acre. Above five, the value increases rapidly and reaches a value of 1 at ten units per acre. This value curve results in giving high value to projects which had high pre-flood densities.

The value curve for parameter 15 is similar to the one for parameter 14. It is structured such that the more residential the area is, the more value is attributable to the project.

The value curve for parameter 16 is the opposite of the curves for parameters 14 and 15, i.e., it decreases as the parameter increases. This in effect gives lower values to projects which are more non-residential than other projects.

Other Parameters

Two of the 18 parameters are multiplicative. As a result, they have no weights associated with them. The two parameters are:

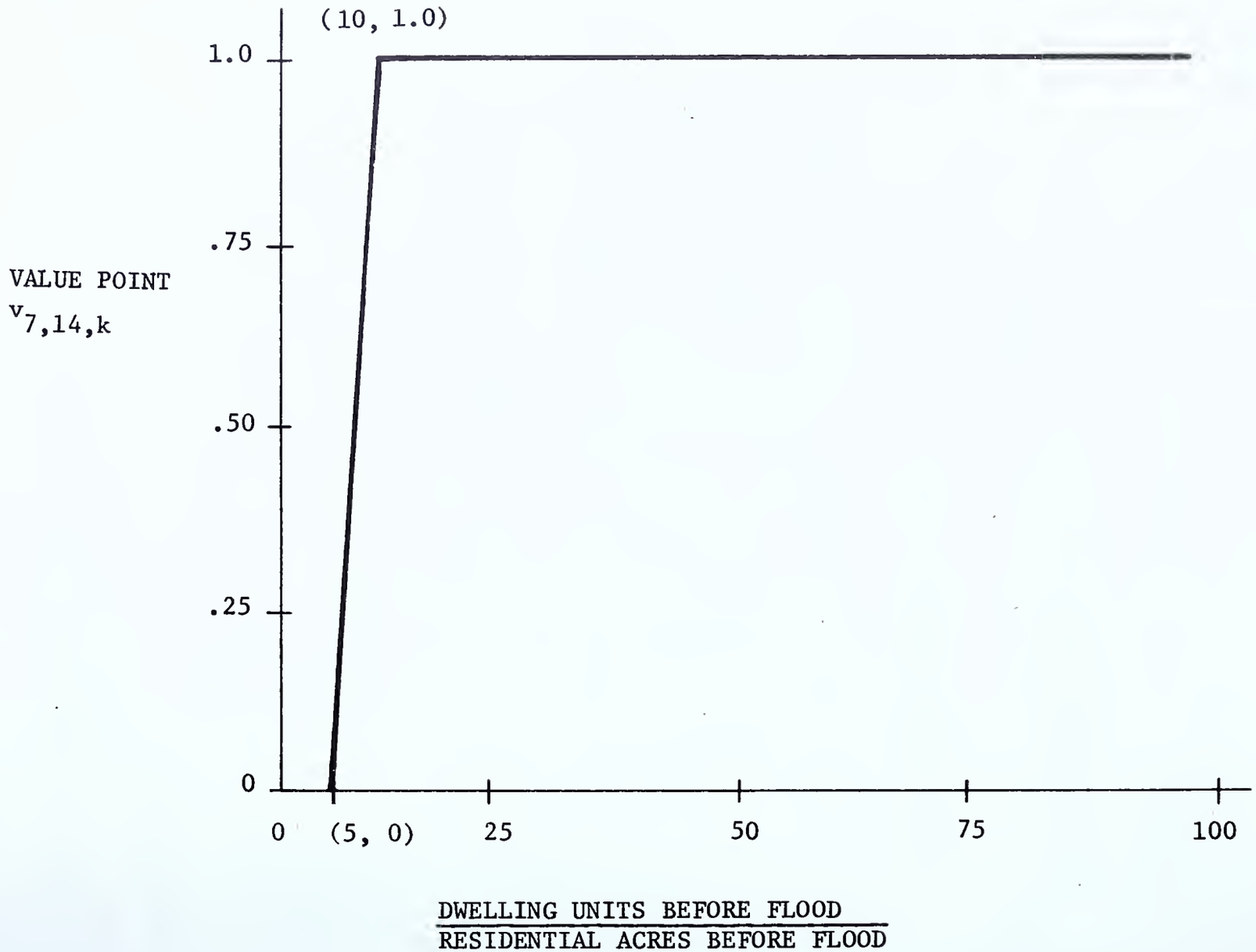

FIGURE 15
VALUE CURVE FOR PRE-FLOOD DENSITY OF DWELLING UNITS

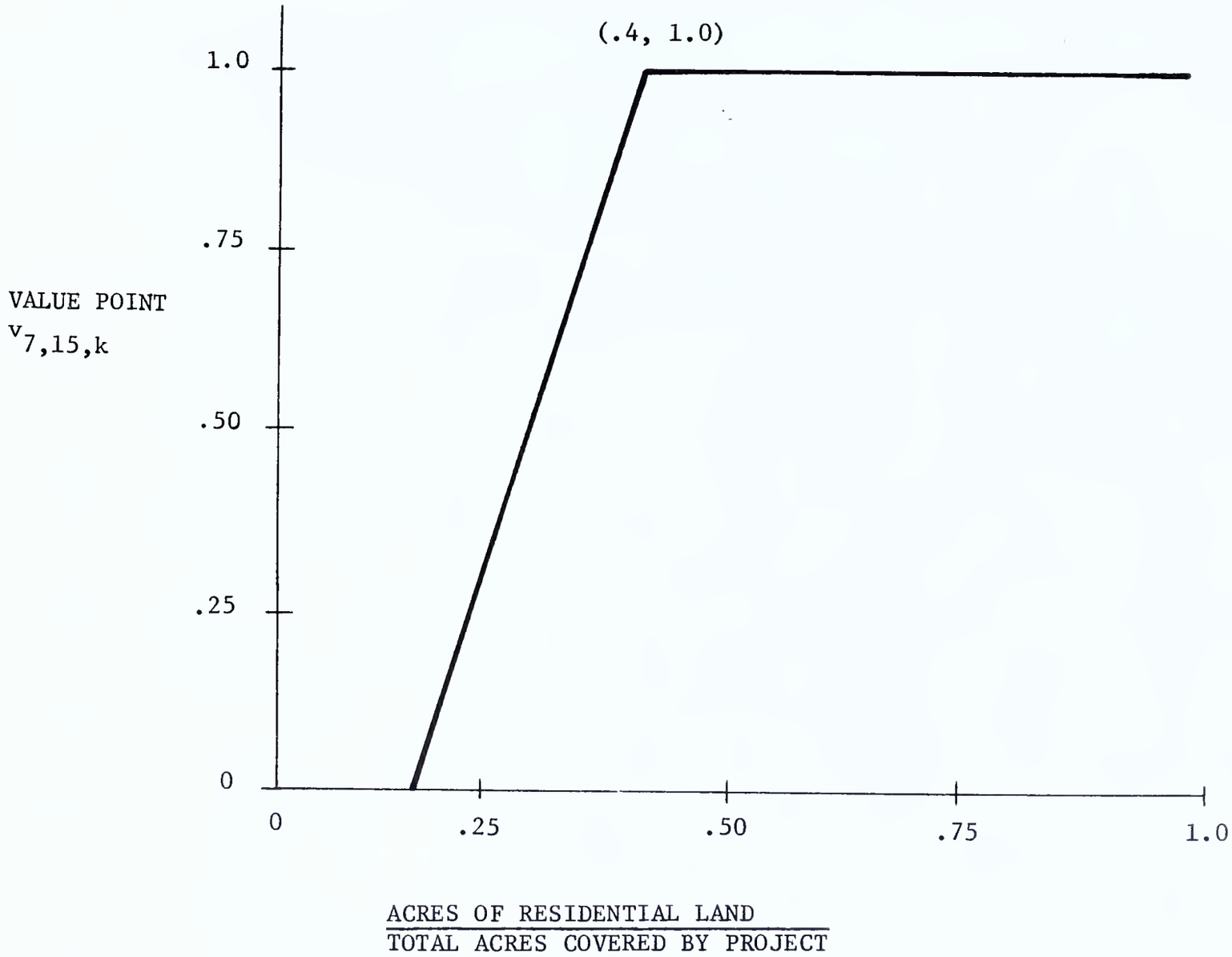

FIGURE 16
VALUE CURVE FOR PORTION OF AREA USED FOR RESIDENTIAL PURPOSES

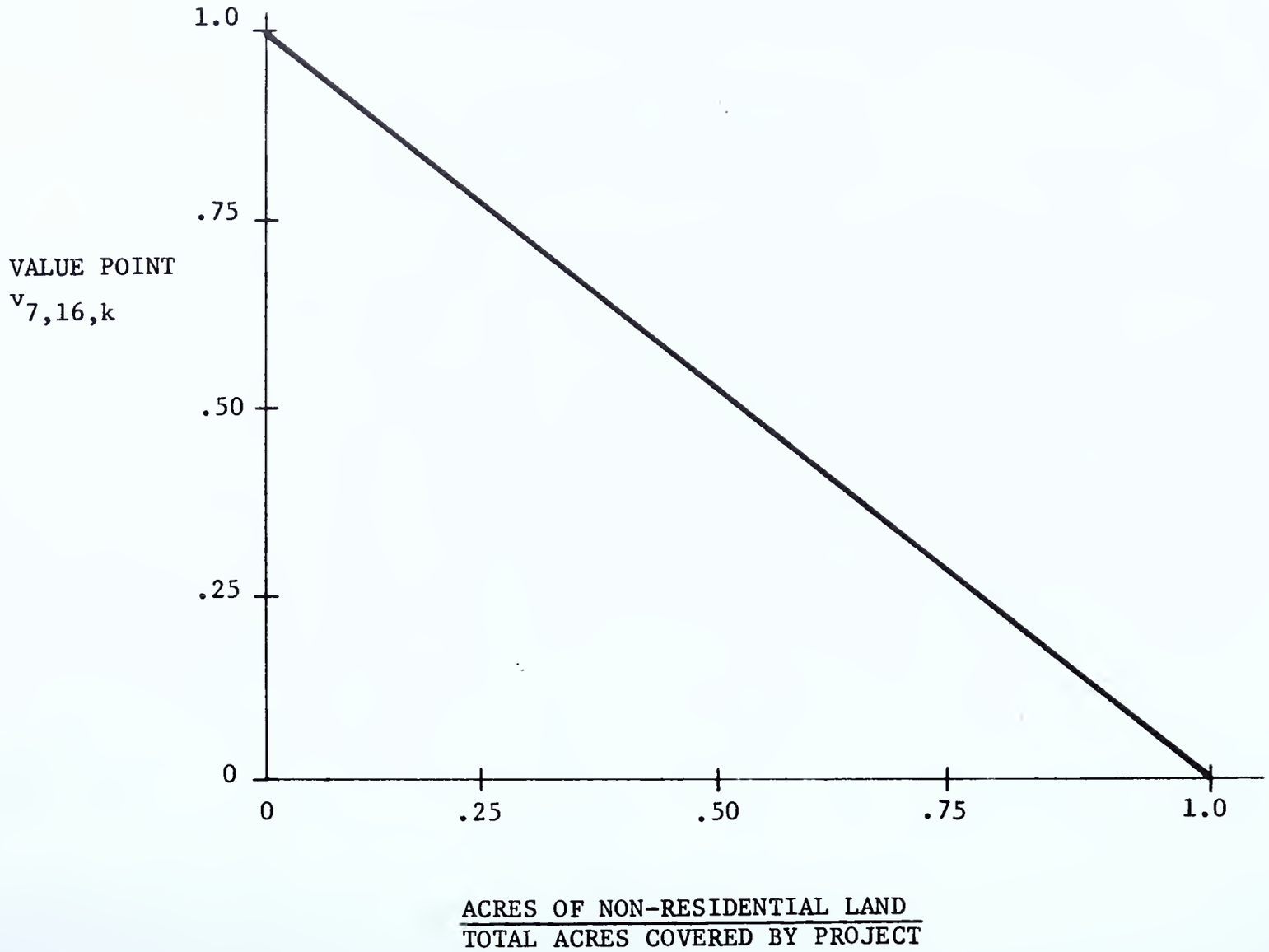

FIGURE 17
VALUE CURVE FOR PORTION OF AREA USED FOR NON-RESIDENTIAL PURPOSES

	Parameter (j)
(a) Portion of buildings undamaged	
$\frac{\text{Buildings undamaged}}{\text{Buildings before flood}}$	17
(b) Portion of land which is vacant	
$\frac{\text{Acres of vacant land}}{\text{Total acres covered by project}}$	18

The value curves for these two parameters are given in Figures 18 and 19. Both curves are decreasing functions and reach zero value when the parameter is equal to one. Since these two parameters are multiplicative, a zero value for either parameter results in a zero value for the project. This is logical since parameter 17 being equal to one means all buildings were undamaged. If parameter 18 is equal to one, all land covered by the project is vacant land. In both cases the project should be rejected. This, of course, would result since the project values would be zero. For these two parameters the value point is given by $v_{j,\ k}$. The subscript i is dropped since the parameters are not associated with any category.

Project Values

The Structured Value for each project is calculated using a mathematical expression which combines the weights for each parameter and category with the values for each parameter obtained from the value curves presented in the preceding paragraphs. The mathematical expression for calculating the Structured Value is:

$$SV_k = 10^{-4} \left(v_{17,k}\right)\left(v_{18,k}\right)\sum_{i=1}^{7} x_i \sum_{j=1}^{16} w_j \ v_{i,j,k}$$

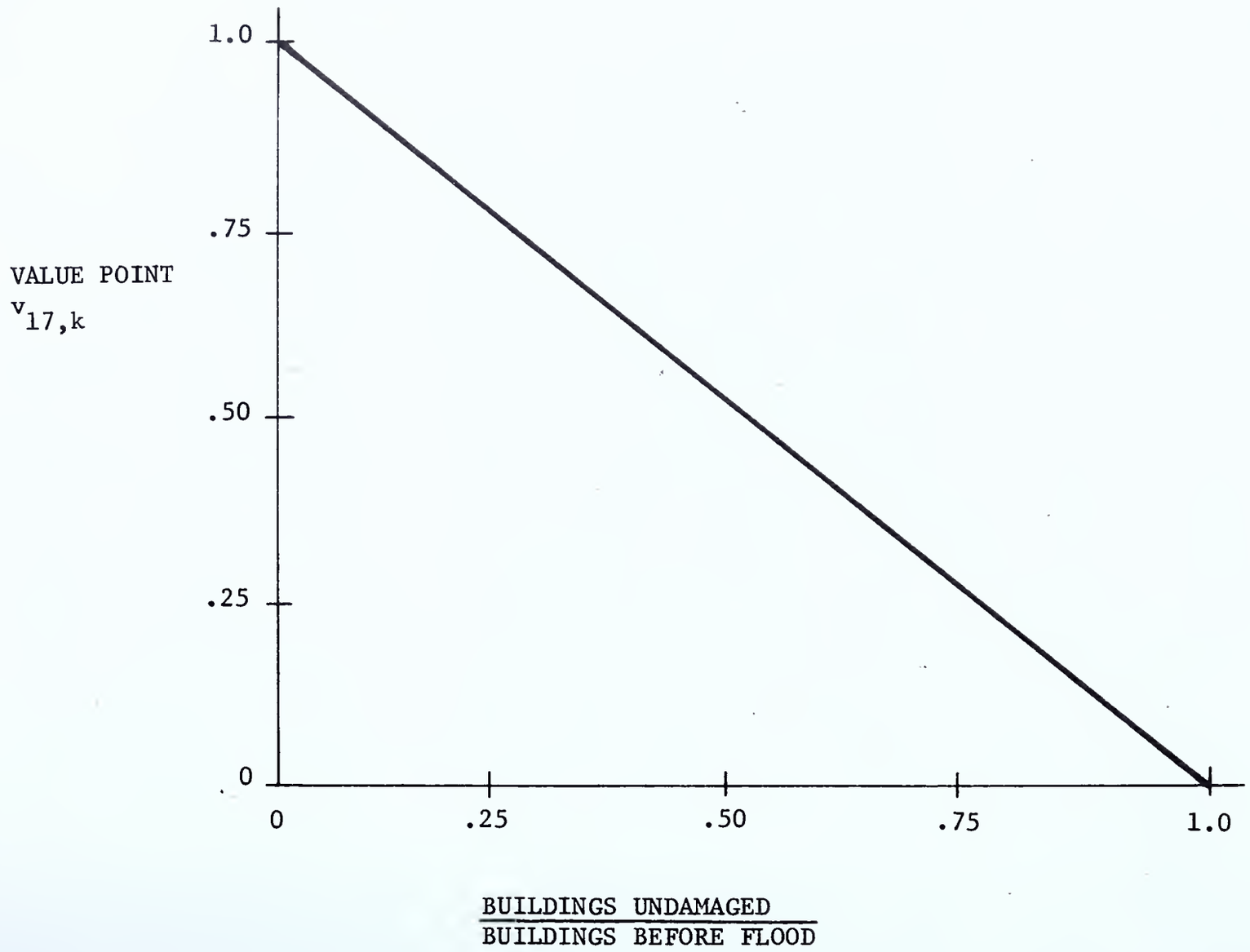

FIGURE 18
VALUE CURVE FOR PORTION OF BUILDINGS UNDAMAGED

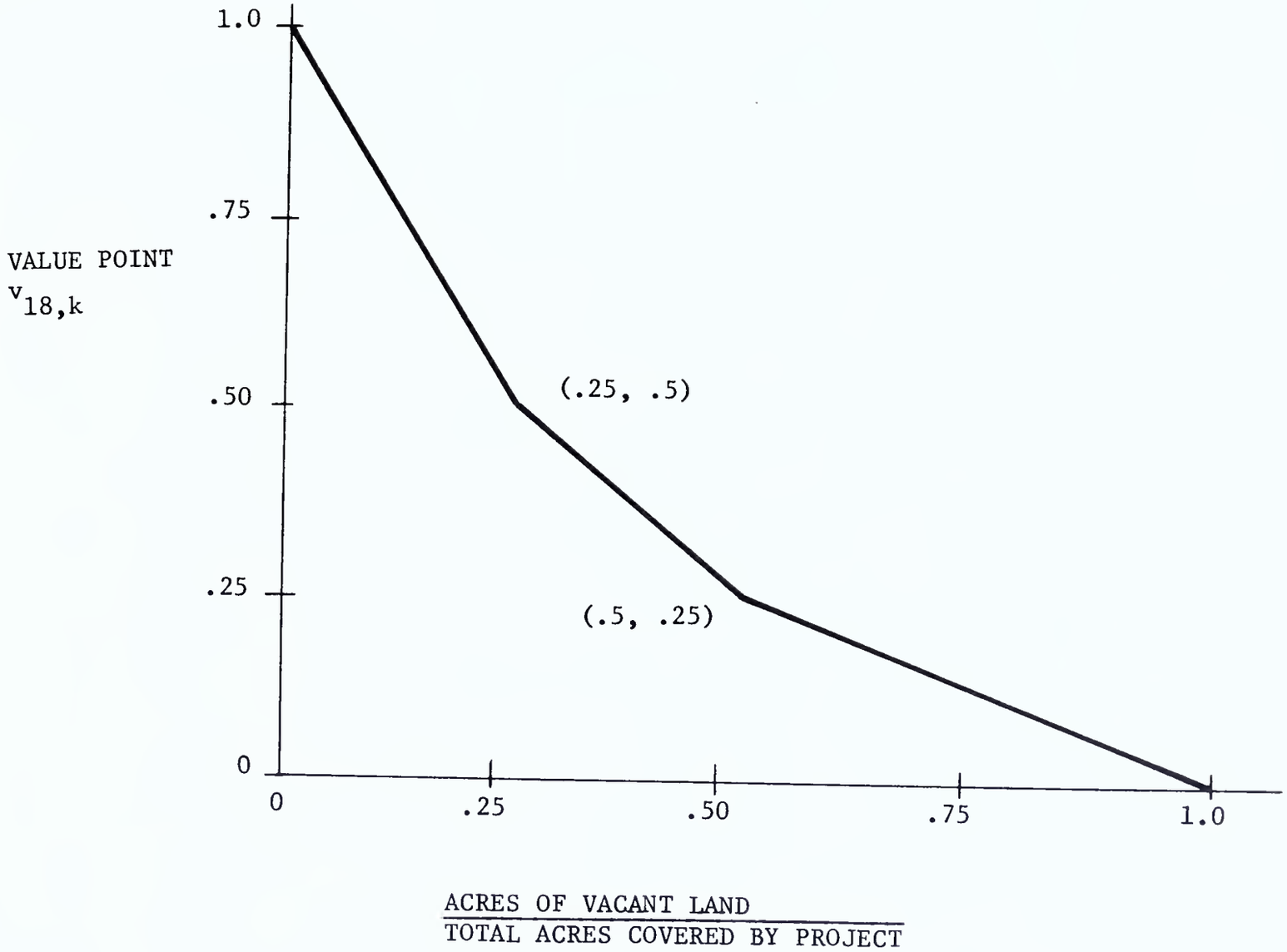

FIGURE 19
VALUE CURVE FOR PORTION OF LAND WHICH IS VACANT

where

SV_k = the Structured Value of project k

x_i = the weight associated with category i

w_j = the weight associated with parameter j

$v_{i,j,k}$ = the value point, obtained from the value curves, of parameter j (in category i) for project k

10^{-4} = a scaling factor to adjust all project values to a range from zero to one.

Parameter Data Point

The equations used to calculate the parameter data point for each project are presented in Appendix B as part of the listing for subroutine BUILDD, Figure B-13. For the most part, these equations are identical to the parameter data point equations presented in the previous paragraphs. However, in some cases, necessary data, such as the number of buildings to be demolished, is not available and must be calculated from the available data. In such cases, this calculation is incorporated into the equation for the data point.

ANALYSIS

SVA and dynamic programming (DP) were used to develop the project mix for the Disaster Urban Renewal Program at various budget levels. In addition, SVA was used to conduct a sensitivity analysis to determine how changes in project data affect the project rankings and to determine which parameters most influence the Structured Value.

The results must be viewed in the light of OSPD's goals for Disaster Urban Renewal. OSPD desired to give preference to projects which could provide a maximum increase in the available housing in the shortest period of time and which could make communities viable

once again. As a result, preference was accorded to heavily damaged residential project areas (parameters 17 and 18) in which a large portion of the buildings was damaged but usable (parameter 4) or unusable but repairable (parameter 3), rather than to non-residential projects (parameters 5 and 6) or to projects in which a large portion of the damaged buildings were destroyed (parameter 1) or unrepairable (parameter 2). In addition, housing requirements in each project area were given preference by parameter 8 which indicates the portion of families still remaining in the area and by parameter 7 which indicates the housing available to these families. Families which had left the project area and not returned were considered not to be part of the area's housing need.

SVA Results

Using the data presented in Appendix D and the SVA model, a Structured Value was calculated at each of nine funding levels for each Disaster Urban Renewal Project. The funding levels ranged, in steps of ten percent, from 20 percent to 100 percent of the requested federal grant.

After the Structured Value was calculated, the projects were rank-ordered according to three criteria. Following this, a sensitivity analysis was performed. Finally, for each project and funding level, a modified Structured Value was input to the dynamic programming routine (DYNM4) to determine the optimal project mix.

Rank-Ordering of Projects

The projects at the 100 percent funding level were rank-ordered using the following three criteria:

(a) Structured Value

(b) $\dfrac{\text{Structured Value}}{\text{Project Cost}}$

(c) $\dfrac{\text{Structured Value}}{\text{Project Cost per Population Unit}}$.

Structured Value Ranking. Table II shows the project rankings when Structured Value is used as the ranking criterion. The top ranked project, Project 45, Fernville, Columbia, is almost entirely residential in nature. It is a heavily damaged area (99 percent of the buildings were destroyed or damaged) in which 93 percent of the residential buildings are either usable or unusable but repairable. In fact, about 90 percent of the original dwelling units are in a usable but damaged condition.

On the other hand, the lowest ranked project, Project 49 (Montoursville, Lycoming), is a non-residential area (75 percent of the land is vacant or unimproved) in which 43 percent of the residential buildings have been destroyed.

Thus, the Structured Value does rank projects by their ability to provide housing during the short-term in residential areas. However, the Structured Value by itself is not sufficient for selecting the most desirable project mix. The cost of each project and the number of families each serves must be considered when determining the level at which to fund each project. The rankings which follow take these latter two factors into account.

Structured Value to Project Cost Ranking. Table III shows the project rankings when the ratio of Structured Value to Project Cost is used as the ranking criterion. From the cost column in this table, it is apparent that this ranking tends to favor the low-cost projects. Most of the low-cost projects are ranked high while most of the high-cost projects are ranked low.

The reason for this is that the parameters in the SVA model used in the analysis consist solely of ratios. Consequently, two projects which have proportionally similar damage will have similar Structured Values, regardless of the size of the project and the number of people it serves. In general, the larger project which serves more

TABLE II
STRUCTURED VALUE RANKINGS

PROJECT RANKINGS ACCORDING TO VALUE

PROJECT		RANK	VALUE
45	FRENSVILLE , COLUMBIA	1	0.6240950
89	MONTESPORT, ALLEGHENY	2	0.6210526
1	SHICKSHINNY, LUZERNE	3	0.5714797
25	WILKES-BARRE(DOWN-TOWN), LUZERNE	4	0.5680758
49	LOCK HAVEN, CLINTON	5	0.5473595
30	POWELL, BRADFORD	6	0.5443639
31	TOWANDA, BRADFORD	7	0.5441498
76	COPAOPOLIS, ALLEGHENY	8	0.5376302
70	TYRONE BORO, BLAIR	9	0.5364742
4	FORTY FORT, LUZERNE	10	0.5297867
66	YORK(URA #1), YORK	11	0.5272780
34	TIOGA BORO, TIOGA	12	0.5251756
71	WILLIAMSBURG, BLAIR	13	0.5171917
68	MONRES ROCKS, ALLEGHENY	14	0.5144855
67	YORK(URA #2), YORK	15	0.5105802
46	MONTGOMERY, LYCOMING	16	0.5104150
36	TUNKHANNOCK TWP, WYCMING	17	0.5077294
21	WEST PITTSTON, LUZERNE	18	0.5062339
44	CATAWISSA BORO, COLUMBIA	19	0.5021544
42	RENOVO, CLINTON	20	0.4885499
57	LEWISBURG, UNION	21	0.4825303
53	LEWISTOWN, MIFFLIN	22	0.4787090
56	TURBUT, NORTHUMBERLAND	23	0.4784160
32	BLOSSBURG, TIOGA	24	0.4755744
20	WEST NANTICOKE, LUZERNE	25	0.4705802
33	LAWRENCEVILLE, TIOGA	26	0.4656367
64	MARIETTA, LANCASTER	27	0.4572227
19	SWOYERSVILLE, LUZERNE	28	0.4568646
28	ATHENS BORO, BRADFORD	29	0.4423547
6	UNIONTOWN, FAYETTE	30	0.4216731
11	KINGSTON, LUZERNE	31	0.4179609
62	MIDDLETOWN, DAUPHIN	32	0.4142340
47	JERSEY SHORE, LYCOMING	33	0.4138771
27	SCHUYLKILL HAVEN, SCHUYLKILL	34	0.4115620
69	HOLIDAYSBURG, BLAIR	35	0.4057600
74	SMITHFIELD, HUNTINGDON	36	0.4017882
10	HANOVER TWP, LUZERNE	37	0.3983648
29	MONROETON, BRADFORD	38	0.3910698
55	MILTON, NORTHUMBERLAND	39	0.3854038
63	STEELTON, DAUPHIN	40	0.3852241
8	EDWARDSVILLE, LUZERNE	41	0.3705965
43	BLOOMSBURG, COLUMBIA	42	0.3705524
39	CASTANEA, CLINTON	43	0.3703060
15	PLAINS, LUZERNE	44	0.3582191
24	WILKES-BARRE(IRON TRIANGLE), LUZERNE	45	0.3565185
3	POTTSTOWN, MONTGOMERY	46	0.3554773
50	MUNCY, LYCOMING	47	0.3524172
13	MOCANAQUA, LUZERNE	48	0.3521019
65	LEBANON, LEBANON	49	0.3481468
12	LUZERNE, LUZERNE	50	0.3387443

TABLE II (CONCLUDED)
STRUCTURED VALUE RANKINGS

PROJECT RANKINGS ACCORDING TO VALUE

PROJECT		RANK	VALUE
72	HUNTINGDON, HUNTINGDON	51	0.3292800
73	MT. UNION, HUNTINGTON	52	0.3228037
41	MILL HALL, CLINTON	53	0.3177336
52	SOUTH WILLIAMSPORT, LYCOMING	54	0.3084749
56	HARRISBURG(CAMERON-SOUTH), DAUPHIN	55	0.3068459
25	WILKES-BARRE(SOUTH), LUZERNE	56	0.2885772
35	MESHOPPEN, WYOMING	57	0.2881058
54	DANVILLE, MONTOUR	58	0.2876820
38	BALD EAGLE, CLINTON	59	0.2810907
59	HARRISBURG(SENECA-SUSQ), DAUPHIN	60	0.2765276
61	LYKENS, DAUPHIN	61	0.2542556
51	OLD LYCOMING, LYCOMING	62	0.2525148
17	PLYMOUTH TWP, LUZERNE	63	0.2490404
5	READING(MODEL CITIES), BERKS	64	0.2449077
60	HIGHSPIRE, DAUPHIN	65	0.2417369
16	PLYMOUTH BORO, LUZERNE	66	0.2296739
2	SOUTH POTTSTOWN, CHESTER	67	0.2172149
37	WEST FALLS, WYOMING	68	0.2128255
14	NANTICOKE, LUZERNE	69	0.2125586
46	DUBOISTOWN, LYCOMING	70	0.2085930
1	KENILWORTH, CHESTER	71	0.1946594
22	WEST WYOMING, LUZERNE	72	0.1940517
4	BIRDSBORO, BERKS	73	0.1894782
76	KEATING, MCKEAN	74	0.1790815
26	WYOMING, LUZERNE	75	0.1425299
75	ELDRED, MCKEAN	76	0.1312678
78	SMETHPORT, MCKEAN	77	0.1237038
77	PORT ALLEGANY, MCKEAN	78	0.1103243
7	READING(SCHUYLKILL), BERKS	79	0.0840738
49	MONTOURSVILLE, LYCOMING	80	0.0799282

TABLE III
STRUCTURED VALUE TO PROJECT COST RANKINGS

PROJECT RANKINGS ACCORDING TO VALUE/COST RATIO

PROJECT	RANK	VALUE	COST(MILLIONS)	VALUE/COST
75 KEATING, MCKEAN	1	0.1790815	0.165	1.0853424
32 GLENSHURG, TIOGA	2	0.4755744	0.794	0.5989602
76 LAFAYETTE, MCKEAN	3	0.1237038	0.282	0.4386659
30 POWELL, BRADFORD	4	0.5443639	1.355	0.4017447
67 YORK(URA #1), YORK	5	0.5105802	1.416	0.3605794
45 BERWILLE, COLUMBIA	6	0.6240950	1.737	0.3592948
34 TIOGA BORO, TIOGA	7	0.5251756	1.462	0.3592172
64 MARIETTA, LANCASTER	8	0.4572227	1.484	0.3081017
44 CATAWISSA BORO, COLUMBIA	9	0.5021544	2.149	0.2336689
75 LORD, MCKEAN	10	0.1312678	0.616	0.2130971
22 WEST WYOMING, LUZERNE	11	0.1940517	0.970	0.2000533
27 SCHUYLKILL HAVEN, SCHUYLKILL	12	0.4115620	2.076	0.1982477
15 PLAINS, LUZERNE	13	0.3582191	1.849	0.1937366
70 TYRONE BORO, BLAIR	14	0.5364742	2.787	0.1924917
77 PORT ALLEGANY, MCKEAN	15	0.1103243	0.574	0.1922026
35 TUNKHANNOCK TWP, WYOMING	16	0.5077294	2.699	0.1881176
3 POTTSTOWN, MONTGOMERY	17	0.3554773	2.067	0.1719775
56 TURBOT, NORTHUMBERLAND	18	0.4784160	2.850	0.1678653
72 HUNTINGDON, HUNTINGDON	19	0.3292800	1.975	0.1667241
71 WILLIAMSBURG, BLAIR	20	0.5171917	3.210	0.1611189
35 MOSHOPPEN, WYOMING	21	0.2881058	1.950	0.1477466
1 KENILWORTH, CHESTER	22	0.1946594	1.319	0.1475811
12 LUZERNE, LUZERNE	23	0.3387443	2.387	0.1419122
33 LAWRENCEVILLE, TIOGA	24	0.4656367	3.365	0.1383764
13 HUCANAQUA, LUZERNE	25	0.3521019	2.719	0.1294968
31 TOWANDA, BRADFORD	26	0.5441498	4.254	0.1279148
4 BIRDSBORO, BERKS	27	0.1894782	1.546	0.1225603
21 WEST PITTSTON, LUZERNE	28	0.5062339	4.453	0.1136838
38 BALD EAGLE, CLINTON	29	0.2810907	2.478	0.1134345
17 PLYMOUTH TWP, LUZERNE	30	0.2490404	2.200	0.1132001
29 MONROETON, BRADFORD	31	0.3910698	3.542	0.1104093
51 OLD LYCOMING, LYCOMING	32	0.2525148	2.344	0.1077281
66 YORK(URA #1), YORK	33	0.5272780	4.989	0.1056881
13 SHICKSHINNY, LUZERNE	34	0.5714797	5.439	0.1050707
48 MONTGOMERY, LYCOMING	35	0.5104150	5.219	0.0977994
52 SOUTH WILLIAMSPORT, LYCOMING	36	0.3084749	3.180	0.0970047
39 CASTANEA, CLINTON	37	0.3703060	4.046	0.0915239
57 LEWISBURG, UNION	38	0.4825303	5.338	0.0903953
53 LEWISTOWN, MIFFLIN	39	0.4787090	5.683	0.0842353
50 MONCY, LYCOMING	40	0.3524172	4.216	0.0835904
68 MCKEES ROCKS, ALLEGHENY	41	0.5144855	6.493	0.0792369
46 DUBOISTOWN, LYCOMING	42	0.2085930	2.642	0.0789527
20 WEST NANTICOKE, LUZERNE	43	0.4705802	6.241	0.0754014
14 NANTICOKE, LUZERNE	44	0.2125586	2.856	0.0744253
26 WYOMING, LUZERNE	45	0.1425299	1.931	0.0738114
69 HOLIDAYSBURG, BLAIR	46	0.4057600	6.265	0.0647661
41 MILL HALL, CLINTON	47	0.3177336	5.077	0.0625829
24 WILKES-BARRE(IRON TRIANGLE), LUZERNE	48	0.3565185	5.800	0.0614687
62 MIDDLETOWN, DAUPHIN	49	0.4142340	6.966	0.0594651
79 CORAOPOLIS, ALLEGHENY	50	0.5376302	9.187	0.0585208

TABLE III (CONCLUDED)
STRUCTURED VALUE TO PROJECT COST RANKINGS

PROJECT RANKINGS ACCORDING TO VALUE/COST RATIO

PROJECT		RANK	VALUE	COST(MILLIONS)	VALUE/COST
2	SOUTH POTTSTOWN, CHESTER	51	0.2172149	3.923	0.0553696
42	RENOVO, CLINTON	52	0.4885499	8.880	0.0550169
74	SMITHFIELD, HUNTINGDON	53	0.4017882	7.492	0.0536290
8	EDWARDSVILLE, LUZERNE	54	0.3705965	6.962	0.0532313
43	BLOOMSBURG, COLUMBIA	55	0.3705524	7.194	0.0515085
73	MT. UNION, HUNTINGTON	56	0.3228037	6.302	0.0512224
37	WEST FALLS, WYOMING	57	0.2128255	4.318	0.0492880
80	MCKEESPORT, ALLEGHENY	58	0.6210526	12.947	0.0479688
26	ATHENS BORO, BRADFORD	59	0.4423547	10.227	0.0432536
63	STEELTON, DAUPHIN	60	0.3852241	8.931	0.0431334
9	FORTY FORT, LUZERNE	61	0.5297867	12.451	0.0425497
60	HIGHSPIRE, DAUPHIN	62	0.2417369	5.781	0.0418158
61	LYKENS, DAUPHIN	63	0.2542556	6.542	0.0388651
54	DANVILLE, MONTOUR	64	0.2876820	8.062	0.0356837
47	JERSEY SHORE, LYCOMING	65	0.4138771	11.788	0.0351100
6	UNIONTOWN, FAYETTE	66	0.4216731	12.690	0.0332288
40	LOCK HAVEN, CLINTON	67	0.5473595	18.330	0.0298614
10	HANOVER TWP, LUZERNE	68	0.3983648	14.051	0.0283514
55	MILTON, NORTHUMBERLAND	69	0.3854038	14.452	0.0266679
19	SWOYERSVILLE, LUZERNE	70	0.4568646	17.396	0.0262626
49	MONTOURSVILLE, LYCOMING	71	0.0799282	3.412	0.0234256
58	HARRISBURG(CAMERON-SOUTH), DAUPHIN	72	0.3068459	13.858	0.0221421
59	HARRISBURG(SENECA-SUSQ), DAUPHIN	73	0.2765276	12.786	0.0216274
16	PLYMOUTH BORO, LUZERNE	74	0.2296739	14.094	0.0162959
5	READING(MODEL CITIES), BERKS	75	0.2449077	16.968	0.0144335
65	LEBANON, LEBANON	76	0.3481468	27.452	0.0126820
11	KINGSTON, LUZERNE	77	0.4179609	44.850	0.0093191
23	WILKES-BARRE(DOWN-TOWN), LUZERNE	78	0.5680758	65.813	0.0086317
25	WILKES-BARRE(SOUTH), LUZERNE	79	0.2883772	44.799	0.0064371
7	READING(SCHUYLKILL), BERKS	80	0.0840738	13.315	0.0063142

families will cost more than the smaller project. So even if both have the same Structured Value, the larger will have a lower Structured Value to Project Cost ranking.

For example, consider Project 32, Blossburg, Tioga, and Project 19, Swoyersville, Luzerne. Both have approximately the same Structured Value; however, Project 32 serves three families at a cost of $0.794 million and Project 19 affects 1,665 families at a cost of $17.396 million. Project 32 is ranked second while Project 19 is ranked seventieth, although Project 19 serves 550 times as many families at only 21 times the cost. This does not appear to be a realistic ranking.

Structured Value to Cost per Family Unit Ranking. Table IV shows the rankings when the Structured Value to Cost per Family Unit ratio is used as the ranking criterion. This ranking attempts to relate the Structured Value and project cost to the number of families served by the project.

As can be seen in the table, the rankings no longer follow the project costs. High cost projects, such as Project 11, Kingston, Luzerne, can have a high rank and low cost projects, such as Project 22, West Wyoming, Luzerne, can have a low rank.

Returning to the previous example, Project 19 is now ranked ninth and Project 32 is now ranked seventy-second. This appears much more realistic than the Structured Value to Project Cost ranking.

Based upon the above analysis, the project cost per family unit, rather than the project cost, will be used by the DP routine to determine the optimal project mix. (An equivalent method is to modify the Structured Value by multiplying it by the number of families in the project area and then to base cost on the project cost. This is what was actually done in the DP analysis, since it was more practical to implement. The return function is the Structured Value multiplied

TABLE IV
STRUCTURED VALUE TO COST PER FAMILY UNIT RANKINGS

PROJECT RANKINGS ACCORDING TO VALUE/(COST PER FAMILY UNIT) RATIO

PROJECT		RANK	VALUE	COST(MILLIONS)	FAMILIES	VALUE/(COST PER FAMILY UNIT)
3	POTTSTOWN, MONTGOMERY	1	0.3554773	2.067	935.0	160.7989197
59	HARRISBURG(SENECA-SUSQ), DAUPHIN	2	0.2765276	12.786	4531.0	97.9936371
21	WEST PITTSTON, LUZERNE	3	0.5062339	4.453	685.0	77.8733673
9	FORTY FORT, LUZERNE	4	0.5297867	12.451	1730.0	73.6110382
64	MARIETTA, LANCASTER	5	0.4572227	1.484	219.0	67.4742584
11	KINGSTON, LUZERNE	6	0.4179609	44.850	6351.0	59.1854858
68	MCKEES ROCKS, ALLEGHENY	7	0.5144855	6.493	645.0	51.1078033
78	SMETHPORT, MCKEAN	8	0.1237038	0.282	105.0	46.0599213
19	SWOYERSVILLE, LUZERNE	9	0.4568646	17.396	1665.0	43.7272644
70	TYRONE BORO, BLAIR	10	0.5364742	2.787	214.0	41.1932068
67	YORK(URA #2), YORK	11	0.5105802	1.416	110.0	39.6637268
40	LOCK HAVEN, CLINTON	12	0.5473595	18.330	1320.0	39.4170685
75	ELDRED, MCKEAN	13	0.1312678	0.616	178.0	37.9312744
28	ATHENS BORO, BRADFORD	14	0.4423547	10.227	840.0	36.3330383
12	LUZERNE, LUZERNE	15	0.3387443	2.387	240.0	34.0589142
52	SOUTH WILLIAMSPORT, LYCOMING	16	0.3084749	3.180	350.0	33.9516144
45	FERNVILLE, COLUMBIA	17	0.6240950	1.737	92.0	33.0551147
54	DANVILLE, MONTOUR	18	0.2876820	8.062	900.0	32.1153259
43	BLOOMSBURG, COLUMBIA	19	0.3705524	7.194	609.0	31.3686829
57	LEWISBURG, UNION	20	0.4825303	5.338	340.0	30.7344055
71	WILLIAMSBURG, BLAIR	21	0.5171917	3.210	189.0	30.4514618
18	SHICKSHINNY, LUZERNE	22	0.5714797	5.439	285.0	29.9451447
48	MONTGOMERY, LYCOMING	23	0.5104150	5.219	300.0	29.3397980
77	PORT ALLEGANY, MCKEAN	24	0.1103243	0.574	148.0	28.4459839
80	MCKEESPORT, ALLEGHENY	25	0.6210526	12.947	550.0	26.3828583
8	EDWARDSVILLE, LUZERNE	26	0.3705965	6.962	490.0	26.0833435
79	CORAOPOLIS, ALLEGHENY	27	0.5376302	9.187	440.0	25.7491302
30	POWELL, BRADFORD	28	0.5443639	1.355	63.0	25.3099060
16	PLYMOUTH BORO, LUZERNE	29	0.2296739	14.094	1550.0	25.2585754
66	YORK(URA #1), YORK	30	0.5272780	4.989	215.0	22.7229309
42	RENOVO, CLINTON	31	0.4885499	8.880	413.0	22.7219696
13	MOCANAQUA, LUZERNE	32	0.3521019	2.719	168.0	21.7554626
10	HANOVER TWP, LUZERNE	33	0.3983648	14.051	765.0	21.6887817
34	TIOGA BORO, TIOGA	34	0.5251756	1.462	58.0	20.8345947
27	SCHUYLKILL HAVEN, SCHUYLKILL	35	0.4115620	2.076	105.0	20.8159943
29	MONROETON, BRADFORD	36	0.3910698	3.542	185.0	20.4257050
69	HOLIDAYSBURG, BLAIR	37	0.4057600	6.265	306.0	19.8184204
6	UNIONTOWN, FAYETTE	38	0.4216731	12.690	594.0	19.7378845
41	MILL HALL, CLINTON	39	0.3177336	5.077	309.0	19.3381042
15	PLAINS, LUZERNE	40	0.3582191	1.849	94.0	18.2112274
47	JERSEY SHORE, LYCOMING	41	0.4138771	11.788	510.0	17.9061127
44	CATAWISSA BORO, COLUMBIA	42	0.5021544	2.149	76.0	17.7588348
55	MILTON, NORTHUMBERLAND	43	0.3854038	14.452	652.0	17.3874359
50	MUNCY, LYCOMING	44	0.3524172	4.216	200.0	16.7180634
53	LEWISTOWN, MIFFLIN	45	0.4787090	5.683	198.0	16.6785736
62	MIDDLETOWN, DAUPHIN	46	0.4142340	6.966	277.0	16.4718323
31	TOWANDA, BRADFORD	47	0.5441498	4.254	125.0	15.9893551
61	LYKENS, DAUPHIN	48	0.2542556	6.542	408.0	15.8569670
36	TUNKHANNOCK TWP, WYOMING	49	0.5077294	2.699	80.0	15.0494051
20	WEST NANTICOKE, LUZERNE	50	0.4705802	6.241	192.0	14.4770622

TABLE IV (CONCLUDED)
STRUCTURED VALUE TO COST PER FAMILY UNIT RANKINGS

FR [illegible] RANKINGS [illegible] VALUE /(COST PER FAMILY UNIT) RATIO

[illegible]	[illegible]	[illegible]NK	VALUE	COST(MILLIONS)	FAMILIES	VALUE/(COST PER FAMILY UNIT)
[illegible]	WILKES-BA[illegible] (S[illegible]), LUZ[illegible]	51	0.2383772	44.799	2246.0	14.4578028
[illegible]	LAW[illegible]VILLE, TI[illegible]GA	52	0.4656367	3.365	104.0	14.3911467
[illegible]	CASTAN[illegible], CLINTON	53	0.3703060	4.046	155.0	14.1862106
[illegible]	HIGHSPI[illegible], DAUPHIN	54	0.2417369	5.781	339.0	14.1755466
78	[illegible]TIN, [illegible]	55	0.1790815	0.165	13.0	14.1094513
[illegible]	[illegible] LYCOMING, LYC[illegible]	56	0.2525148	2.344	130.0	14.0046558
[illegible]	BALD [illegible], CLINTON	57	0.2810907	2.478	107.0	12.1374903
37	WEST FALLS, WYOMING	58	0.2128255	4.318	212.0	10.4490538
76	[illegible], HUNTINGDON	59	0.4017882	7.492	166.0	8.9024076
67	STE[illegible], DAUPHIN	60	0.3852241	8.931	190.0	8.1953392
4	BIRDSB[illegible], BERKS	61	0.1894762	1.546	58.0	7.1084948
2	SOUTH POTTSTOWN, CHESTER	62	0.2172149	3.923	122.0	6.7550898
46	DUR[illegible]STOWN, LYCOMING	63	0.2085930	2.642	80.0	6.3162136
55	TURB[illegible], CO THUMBERLAND	64	0.4784160	2.850	37.0	6.2110147
35	[illegible], WYOMING	65	0.2881058	1.950	40.0	5.9098625
73	MT. UNION, HUNTINGTON	66	0.3228037	6.302	110.0	5.6344662
3	READING(MODE[illegible] CITIES), BERKS	67	0.2449077	16.963	331.0	4.7774925
[illegible]	WILKES-BA[illegible](I[illegible] TRIANGLE), LUZERNE	68	0.3565185	5.800	74.0	4.5486841
23	WILKES-BA[illegible](L[illegible]W-TOWN), LUZERNE	69	0.5680758	65.813	510.0	4.4021492
17	PLYMOUTH TWP, LUZERNE	70	0.2490404	2.200	30.0	3.3960037
49	MONTOURSVILLE, LYCOMING	71	0.0799282	3.412	135.0	3.1624565
56	HARRISBURG(CAMERON-SOUTH), DAUPHIN	72	0.3068459	13.858	120.0	2.6570568
26	WYOMING, LUZERNE	73	0.1425299	1.931	35.0	2.5833988
65	LEBANON, LEBANON	74	0.3481468	27.452	186.0	2.3588552
14	WANTIGOKE, LUZERNE	75	0.2125586	2.856	30.0	2.2327576
1	KENILWORTH, CHESTER	76	0.1946594	1.319	15.0	2.2137165
32	BLOSSBURG, TIOGA	77	0.4755744	0.794	3.0	1.7968798
7	READING(SCHUYLKILL), BERKS	78	0.0840738	13.315	166.0	1.0481586
22	WEST WYOMING, LUZERNE	79	0.1940517	0.970	2.0	0.4001067
72	HUNTINGDON, HUNTINGDON	80	0.3292800	1.975	1.0	0.1667241

by the number of families. The state variable is the project cost. Since the two methods are equivalent, possibly, as a future refinement, the SVA model should be modified to incorporate this change.)

Sensitivity Analysis

A sensitivity analysis was conducted to evaluate how changes in parameter values affect the project ranking and to determine which parameters most influence the project ranking.

The sensitivity analysis consisted of setting one parameter to +10% of its original value for each project at the 100-percent funding level, calculating the new Structured Value and re-ranking the projects. This was repeated for each parameter, holding all other parameters constant. The same procedure was carried out setting each parameter to -10% of its original value at the 100-percent funding level.

Sensitivity of Project Ranking to Changes in Parameter Value. Some of the project data are of questionable validity. Consequently, it is imperative to determine how sensitive the project rankings are to changes in the parameter data points.

Tables V and VI summarize the changes in project ranking that result from the sensitivity analysis. Each table presents the results for variations of ± 10 percent.

When each parameter was varied by ± 10 percent, not every project's ranking was affected. For each project, the tables show the number of parameters which did cause changes in the project's ranking. The magnitude of the maximum change caused by any one parameter is shown. The average change in the projects' rankings is also presented. This average change is obtained by summing the magnitude of both the positive and negative position changes in a project's ranking and dividing the result by the number of parameters which caused a change.

Table V presents the results when the projects are ranked according to Structured Value. The rankings of 77 projects are not affected

TABLE V
SENSITIVITY ANALYSIS OF STRUCTURED VALUE RANKINGS

	VARIATION					
	+ 10 Percent			- 10 Percent		
PROJECT	Number of Parameters Affecting Ranking	Maximum Ranking Change	Average Ranking Change	Number of Parameters Affecting Ranking	Maximum Ranking Change	Average Ranking Change
1	4	1	1.0	6	1	1.0
2	0	0	0	2	1	1.0
3	10	3	1.4	6	5	2.0
4	1	1	1.0	2	2	1.5
5	2	2	1.5	1	2	2.0
6	4	6	3.0	3	5	2.3
7	1	1	1.0	1	1	1.0
8	8	2	1.5	9	3	1.8
9	3	2	1.7	7	6	1.9
10	3	2	1.3	3	4	2.7
11	5	3	1.4	5	3	1.6
12	2	1	1.0	2	4	2.5
13	7	2	1.3	7	5	2.0
14	7	1	1.0	6	1	1.0
15	1	3	3.0	10	3	1.5
16	0	0	0	1	1	1.0
17	3	2	1.3	1	2	2.0
18	2	1	1.0	1	1	1.0
19	4	1	1.0	8	3	1.3
20	3	1	1.0	2	4	3.5
21	7	2	1.1	6	3	1.3
22	4	1	1.0	6	5	1.7
23	3	3	1.7	1	1	1.0

TABLE V (CONTINUED)
SENSITIVITY ANALYSIS OF STRUCTURED VALUE RANKINGS

	VARIATION					
	+ 10 Percent			- 10 Percent		
PROJECT	Number of Parameters Affecting Ranking	Maximum Ranking Change	Average Ranking Change	Number of Parameters Affecting Ranking	Maximum Ranking Change	Average Ranking Change
24	7	5	1.7	11	3	1.5
25	9	2	1.1	7	2	1.6
26	0	0	0	0	0	0
27	4	2	1.3	3	3	2.3
28	1	1	1.0	1	1	1.0
29	3	1	1.0	2	2	2.0
30	8	3	1.4	7	5	1.7
31	9	2	1.2	4	5	2.3
32	7	2	1.3	3	3	2.7
33	1	1	1.0	3	4	2.7
34	3	1	1.0	4	6	2.5
35	8	2	1.1	8	2	1.1
36	6	1	1.0	4	3	1.5
37	7	1	1.0	6	1	1.0
38	2	1	1.0	2	1	1.0
39	6	3	1.8	9	2	1.8
40	5	2	1.4	6	4	2.0
41	2	1	1.0	3	2	1.3
42	1	2	2.0	3	4	2.0
43	6	1	1.0	7	1	1.0
44	3	2	1.3	4	2	1.5
45	1	1	1.0	0	0	0
46	1	2	2.0	2	1	1.0

TABLE V (CONTINUED)
SENSITIVITY ANALYSIS OF STRUCTURED VALUE RANKINGS

	VARIATION					
	+ 10 Percent			- 10 Percent		
PROJECT	Number of Parameters Affecting Ranking	Maximum Ranking Change	Average Ranking Change	Number of Parameters Affecting Ranking	Maximum Ranking Change	Average Ranking Change
47	5	2	1.4	9	2	1.2
48	6	2	1.5	9	2	1.4
49	1	1	1.0	1	1	1.0
50	9	2	1.1	6	3	1.7
51	3	3	2.0	5	1	1.0
52	3	1	1.0	5	1	1.0
53	12	2	1.2	8	4	1.8
54	5	2	1.8	8	3	1.3
55	5	2	1.2	11	3	1.2
56	11	2	1.1	9	5	1.8
57	5	4	2.2	6	2	1.5
58	3	2	1.3	6	2	1.2
59	2	4	3.5	1	4	4.0
60	1	1	1.0	2	2	1.5
61	1	1	1.0	5	3	1.4
62	5	2	1.2	9	3	1.3
63	5	3	1.8	10	4	1.3
64	5	2	1.2	9	2	1.1
65	4	5	2.3	4	3	1.5
66	4	2	1.3	7	4	1.6
67	5	2	1.2	8	5	1.6
68	4	1	1.0	7	5	1.6

TABLE V (CONTINUED)
SENSITIVITY ANALYSIS OF STRUCTURED VALUE RANKINGS

	VARIATION					
	+ 10 Percent			- 10 Percent		
PROJECT	Number of Parameters Affecting Ranking	Maximum Ranking Change	Average Ranking Change	Number of Parameters Affecting Ranking	Maximum Ranking Change	Average Ranking Change
69	4	4	2.3	5	5	2.6
70	7	2	1.3	3	4	2.3
71	3	2	1.3	5	5	1.8
72	2	1	1.0	2	1	1.0
73	2	1	1.0	3	2	1.3
74	3	1	1.0	4	2	1.3
75	0	0	0	0	0	0
76	1	1	1.0	1	1	1.0
77	0	0	0	0	0	0
78	0	0	0	0	0	0
79	8	3	1.4	4	6	2.8
80	1	1	1.0	0	0	0

TABLE VI
SENSITIVITY ANALYSIS OF STRUCTURED VALUE TO COST PER FAMILY UNIT RANKINGS

	VARIATION					
	+ 10 Percent			- 10 Percent		
PROJECT	Number of Parameters Affecting Ranking	Maximum Ranking Change	Average Ranking Change	Number of Parameters Affecting Ranking	Maximum Ranking Change	Average Ranking Change
1	3	1	1.0	3	1	1.0
2	0	0	0	0	0	0
3	0	0	0	0	0	0
4	0	0	0	0	0	0
5	1	1	1.0	0	0	0
6	7	3	1.3	3	2	1.3
7	0	0	0	0	0	0
8	1	1	1.0	3	1	1.0
9	0	0	0	0	0	0
10	3	1	1.0	3	1	1.0
11	0	0	0	0	0	0
12	3	2	1.3	4	1	1.0
13	4	2	1.3	3	2	1.3
14	3	1	1.0	3	1	1.0
15	1	2	2.0	2	1	1.0
16	3	1	1.0	4	3	2.0
17	0	0	0	1	1	1.0
18	2	1	1.0	2	1	1.0
19	1	1	1.0	1	1	1.0
20	6	1	1.0	5	5	2.0
21	0	0	0	0	0	0
22	0	0	0	0	0	0
23	1	1	1.0	0	0	0

TABLE VI (CONTINUED)
SENSITIVITY ANALYSIS OF STRUCTURED VALUE TO COST PER FAMILY UNIT RANKINGS

	VARIATION					
	+ 10 Percent			- 10 Percent		
PROJECT	Number of Parameters Affecting Ranking	Maximum Ranking Change	Average Ranking Change	Number of Parameters Affecting Ranking	Maximum Ranking Change	Average Ranking Change
24	2	1	1.0	0	0	0
25	7	1	1.0	7	1	1.0
26	0	0	0	1	1	1.0
27	5	1	1.0	5	1	1.0
28	1	1	1.0	1	1	1.0
29	2	2	1.5	3	2	1.3
30	3	1	1.0	3	1	1.0
31	4	2	1.3	3	1	1.0
32	0	0	0	0	0	0
33	2	2	1.5	5	4	1.6
34	5	2	1.2	4	2	1.3
35	0	0	0	1	1	1.0
36	0	0	0	2	2	2.0
37	0	0	0	0	0	0
38	0	0	0	0	0	0
39	9	2	1.1	7	3	1.3
40	2	1	1.0	1	1	1.0
41	2	2	1.5	1	2	2.0
42	6	1	1.0	8	2	1.3
43	2	1	1.0	2	1	1.0
44	2	2	2.0	3	2	1.7
45	2	2	1.5	3	1	1.0
46	1	1	1.0	1	1	1.0

TABLE VI (CONTINUED)
SENSITIVITY ANALYSIS OF STRUCTURED VALUE TO COST PER FAMILY UNIT RANKINGS

	VARIATION					
	+ 10 Percent			- 10 Percent		
PROJECT	Number of Parameters Affecting Ranking	Maximum Ranking Change	Average Ranking Change	Number of Parameters Affecting Ranking	Maximum Ranking Change	Average Ranking Change
47	0	0	0	4	1	1.0
48	1	1	1.0	1	1	1.0
49	1	3	3.0	1	1	1.0
50	6	3	1.3	6	2	1.2
51	3	2	1.3	7	3	1.6
52	3	1	1.0	4	2	1.3
53	6	2	1.2	7	1	1.0
54	1	1	1.0	4	1	1.0
55	1	1	1.0	1	2	2.0
56	1	1	1.0	2	1	1.0
57	4	3	1.8	4	2	1.3
58	1	1	1.0	1	1	1.0
59	0	0	0	0	0	0
60	11	2	1.1	6	4	1.7
61	3	1	1.0	3	1	1.0
62	0	0	0	3	1	1.0
63	0	0	0	0	0	0
64	0	0	0	0	0	0
65	1	2	2.0	1	2	2.0
66	6	1	1.0	7	1	1.0
67	2	1	1.0	1	1	1.0
68	0	0	0	1	1	1.0
69	6	1	1.0	3	2	1.3

TABLE VI (CONTINUED)
SENSITIVITY ANALYSIS OF STRUCTURED VALUE
TO COST PER FAMILY UNIT RANKINGS

	VARIATION					
	+ 10 Percent			- 10 Percent		
PROJECT	Number of Parameters Affecting Ranking	Maximum Ranking Change	Average Ranking Change	Number of Parameters Affecting Ranking	Maximum Ranking Change	Average Ranking Change
70	0	0	0	1	1	1.0
71	4	2	1.3	4	1	1.0
72	0	0	0	0	0	0
73	0	0	0	0	0	0
74	0	0	0	0	0	0
75	1	1	1.0	1	3	3.0
76	4	1	1.0	9	6	1.9
77	1	1	1.0	1	5	5.0
78	1	1	1.0	2	1	1.0
79	2	1	1.5	3	1	1.0
80	1	1	1.0	3	3	2.0

by the + 10 percent variations in nine or more of the parameters. The rankings of 76 projects are not affected by - 10 percent variations in nine or more of the parameters. The largest change caused by any one parameter is only six positions. For the + 10 percent variation, 65 projects have a maximum ranking change of two positions or less, and 74 have an average change of two positions or less. For the - 10 percent variation, 40 projects have a maximum ranking change of two positions or less and 68 have an average change of two positions or less. Thus, it appears that the Structured Value ranking is relatively insensitive to changes in parameter data points of ± 10 percent or less.

Table VI presents the results when the projects are ranked according to the ratio of Structured Value to Cost per Family Unit. The effects are considerably smaller than those exhibited in Table V. The rankings of 76 projects are not affected by + 10 percent variations in 12 or more of the parameters. The rankings of 73 projects are not affected by - 10 percent variations in 12 or more of the parameters.

For the + 10 percent variation, the largest change caused by any one parameter is only three positions and the average change is 1.5 positions or less for 78 projects. Twenty-five projects do not have any ranking change. For the - 10 percent variation, the largest change caused by any one parameter is only six positions and the average change is 1.5 positions or less for 69 projects. Twenty projects do not have any ranking change. It appears that this ranking criterion is very insensitive to changes of ± 10 percent or less in the parameter data points. Thus, the optimal project mix obtained with the dynamic programming routine should also be very insensitive to any such changes in the parameter data points.

The position changes for the Structured Value to Project Cost ratio are not shown; however, they fell in between the values shown in Tables V and VI.

Sensitivity of the Projects to Individual Parameters. Tables VII and VIII present the total number of positive position changes in project ranking that occurred when each parameter was varied by ± 10 percent. (There is an equivalent number of negative position changes so they are not considered in the analysis.) Table VII shows the changes for the Structured Value rankings. Table VIII shows the changes for the Structured Value to Cost per Family Unit rankings.

An analysis of the results presented in Table VII shows that the five most significant parameters in order of importance are parameters 7, 18, 17, 4 and 8. By the way in which the weights were established, it was expected that parameters 17, 18, 4, 8 and 10 would be dominant, in that order.

Parameter 7, the portion of usable dwelling units per family after the flood, was not expected to be as dominant as it is. The reason for its effect has to do with the shape of its value curve. From a parameter value point of 0.9 at parameter data point 0.9, the curve rapidly drops to parameter value point 0 at parameter data point 1.0. A parameter data point of 1.0 corresponds to there being at least as many usable dwelling units in the project area as there are families. There are 19 projects for which this parameter data point is 1.0 and a number of others where it is slightly less than or greater than 1.0. For these projects there will be a sharp increase in value when parameter 7 is changed by -10%. Consequently, such projects tend to have changes of several places in rank for changes of -10% in this parameter. Since there are fewer projects whose parameter data points are originally around the breakpoint at 0.9 for Parameter 7, a change of +10% does not drastically affect the ranking of as many projects. Tables VII and VIII do show that the vast majority of changes occur when Parameter 7 is varied by -10%. There is nothing wrong with this result. The value curve could be changed, but then it would not reflect the desired value of each parameter data point.

TABLE VII
SENSITIVITY OF PARAMETERS USING STRUCTURED VALUE RANKINGS

	VARIATION	
	+10 Percent	- 10 Percent
PARAMETER	Positive Position Changes	Positive Position Changes
1	6	9
2	2	3
3	10	7
4	18	23
5	2	6
6	8	12
7	24	84
8	19	14
9	1	3
10	1	5
11	0	1
12	10	2
13	8	5
14	5	12
15	11	13
16	2	3
17	36	40
18	51	49

TABLE VIII
SENSITIVITY OF PARAMETERS USING STRUCTURED VALUE TO COST PER FAMILY UNIT RANKINGS

	VARIATION	
	+ 10 Percent	- 10 Percent
PARAMETER	Positive Position Changes	Positive Position Changes
1	2	3
2	0	2
3	4	4
4	8	7
5	1	2
6	4	5
7	6	23
8	9	4
9	1	0
10	1	1
11	1	0
12	5	1
13	1	2
14	4	5
15	5	4
16	2	0
17	11	17
18	31	43

There are other parameters, such as 1, 5, 9, 10, 11, 14 and 15, which also have slopes as steep as Parameter 7. However, for these parameters there are not nearly as many projects which have data points in the vicinity of these breakpoints as does Parameter 7. Thus, the effect of these parameters on the Structured Value is not as great.

Dynamic Programming Results

Using DYNM4, project mixes were obtained for the Disaster Urban Renewal Program at budget levels between $200 million and $620 million in steps of $20 million. In addition, the project mix corresponding to the federally allocated grant funding level of $380.4 million was determined.

Program Value versus Available Budget

Figure 20 shows the optimal program value as a function of the available budget. This curve exhibits the economic law of diminishing returns.

The curve is fairly linear until about $420 million and then tends to flatten out. The marginal return from expenditures above $420 million rapidly approach zero. It is thus quite possible that this level of funding would be the most productive for the Commonwealth. Additional funds might be better spent for other programs. Such a determination is beyond the scope of this study because it requires that all recovery programs be considered.

The last column of Table IX presents the funding allocated by DP at a budget level of $380.4 million. The amounts in parentheses indicate the additional project funding required to obtain the optimal project mix at a budget level of $420 million.

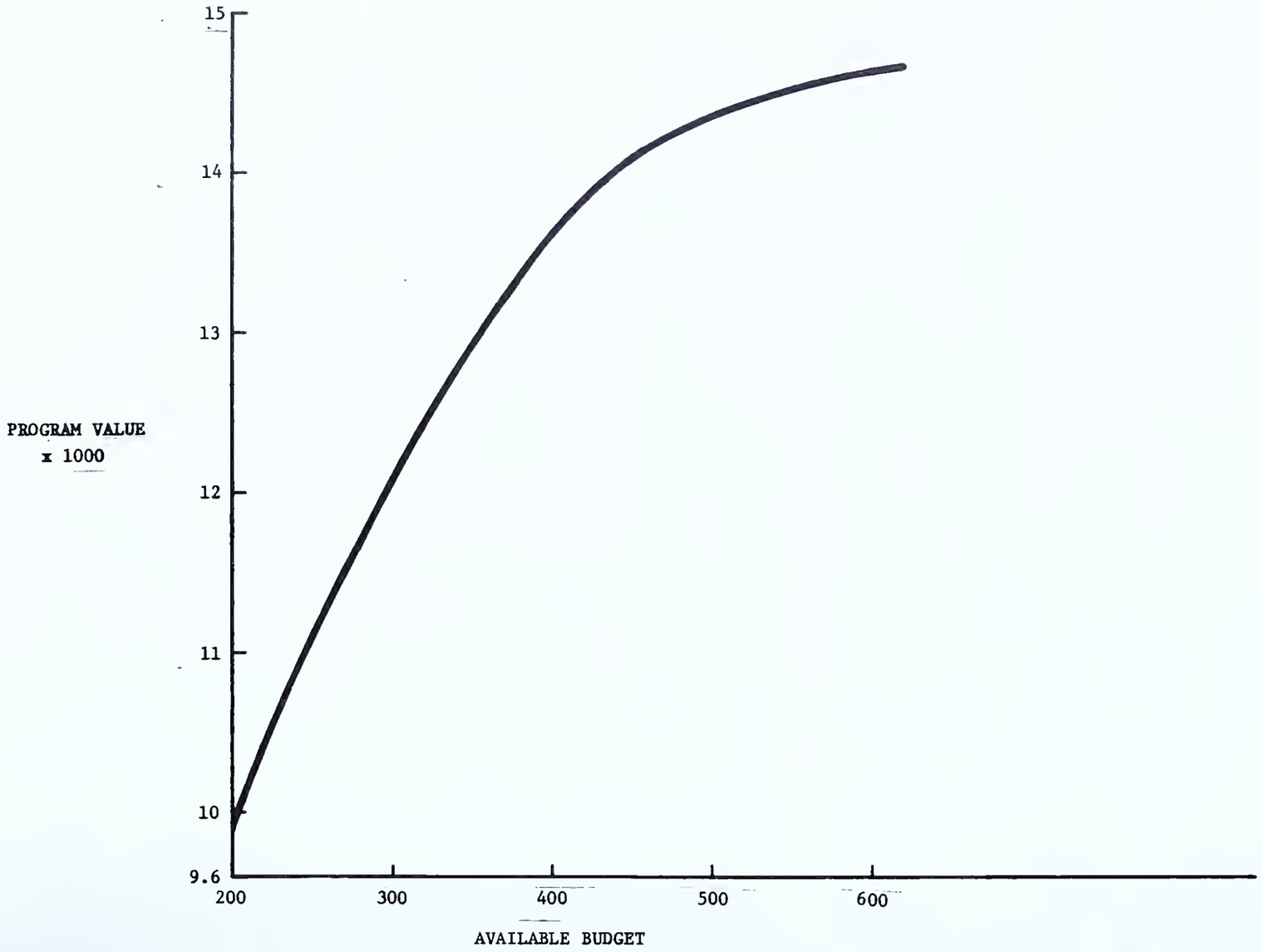

FIGURE 20
PROGRAM VALUE VS. AVAILABLE BUDGET

TABLE IX
FUNDS ALLOCATED AT A BUDGET LEVEL OF $380.4 MILLION
(IN MILLIONS OF DOLLARS)

PROJECT NUMBER	FUNDS REQUESTED	FEDERAL ALLOCATION	DP ALLOCATION
1	1.319	1.2	---
2	3.923	2.2	---
3	2.067	---	2.1
4	1.546	1.6 *	0.6 (0.2)
5	16.968	12.0	---
6	12.69	4.0	12.7
7	13.315	9.0	---
8	6.962	5.0	7.0
9	12.451	8.0	12.5
10	14.051	15.0 *	14.1
11	44.850	48.0 *	44.8
12	2.387	1.7	2.4
13	2.719	---	2.7
14	2.856	2.2	---
15	1.849	---	1.8
16	14.094	11.0	14.1
17	2.2	.6	---
18	5.439	3.0	5.4
19	17.396	13.0	17.4
20	6.241	3.2	3.7 (2.5)
21	4.453	1.0	4.5
22	.97	.7	---
23	65.813	46.0	---
24	5.8	7.3 *	---
25	44.799	31.5	22.4 (22.4)

* Federally funded at over 100 percent of request.

TABLE IX (CONTINUED)
FUNDS ALLOCATED AT A BUDGET LEVEL OF $380.4 MILLION
(IN MILLIONS OF DOLLARS)

PROJECT NUMBER	FUNDS REQUESTED	FEDERAL ALLOCATION	DP ALLOCATION
26	1.931	.9	---
27	2.076	1.8	2.1
28	10.227	7.0	10.2
29	3.542	---	3.5
30	1.355	---	1.4
31	4.254	---	3.8 (0.5)
32	.794	.7	---
33	3.365	2.7	3.0 (0.4)
34	1.462	1.0	1.5
35	1.95	---	---
36	2.699	---	2.4 (0.3)
37	4.318	2.5	1.3 (1.3)
38	2.478	---	--- (2.2)
39	4.046	2.5	2.8 (1.2)
40	18.33	11.0	18.3
41	5.077	---	5.1
42	8.88	4.0	8.9
43	7.194	4.5	7.2
44	2.149	1.1	2.1
45	1.737	---	1.7
46	2.642	.6	---
47	11.788	5.0	11.8
48	5.219	.8	5.2
49	3.412	1.5	---
50	4.216	---	4.2

TABLE IX (CONTINUED)
FUNDS ALLOCATED AT A BUDGET LEVEL OF $380.4 MILLION
(IN MILLIONS OF DOLLARS)

PROJECT NUMBER	FUNDS REQUESTED	FEDERAL ALLOCATION	DP ALLOCATION
51	2.344	---	1.6 (0.7)
52	3.18	---	3.2
53	5.683	5.1	4.5 (1.2)
54	8.062	5.0	8.1
55	14.452	5.4	14.5
56	2.850	.6	---
57	5.338	---	5.3
58	13.858	13.1	---
59	12.786	3.7	12.8
60	5.781	3.7	4.6 (1.2)
61	6.542	3.1	6.5
62	6.966	5.5	4.2 (2.8)
63	8.931	9.2 *	--- (2.7)
64	1.484	---	1.5
65	27.452	16.0	---
66	4.989	3.0	5.0
67	1.416	---	1.4
68	6.493	3.2	6.5
69	6.265	---	6.3
70	2.787	2.8	2.8
71	3.21	1.7	3.2
72	1.975	1.2	---

* Federally funded at over 100 percent of request.

TABLE IX (CONCLUDED)
FUNDS ALLOCATED AT A BUDGET LEVEL OF $380.4 MILLION
(IN MILLIONS OF DOLLARS)

PROJECT NUMBER	FUNDS REQUESTED	FEDERAL ALLOCATION	DP ALLOCATION
73	6.302	6.3	---
74	7.492	3.5	---
75	.616	---	0.6
76	.165	2.5 *	0.1
77	.574	---	0.6
78	.282	---	0.3
79	9.187	5.0	9.2
80	12.947	6.0	12.9

* Federally funded at over 100 percent of request.

Solution with Unlimited Funding

A total federal grant of $612.8 is required to fund every project at the 100 percent level. However, even when this funding is available, the DP solution does not fund every project at the 100 percent level. Project 24, Wilkes-Barre (Iron Triangle), Luzerne, is never funded above 60.34 percent. The reason being that the return from this project decreases for funding above this level (see Figure 21). All other projects are funded at 100 percent when at least $610.5 million is available.

Project Mix at $380.4 Million

Table IX gives the optimal project mix when $380.4 million in funding is available. The table shows both the federal allocation of funds and the DP allocation. As can be seen, there are considerable differences between the two allocations.

The differences must be viewed in light of the OSPD goals discussed earlier. Specific examples will be used to illustrate the differences.

Projects Funded over 100% Federally, but not Selected for Funding by DP. Two projects, Project 24, Wilkes Barre (Iron Triangle), Luzerne, and Project 63, Steelton, Dauphin, were not selected by DP for funding but were federally funded at over 100 percent of the requested funds.

In Project 24, about 46 percent of the residential buildings and 61 percent of the non-residential buildings were destroyed. In fact, about 75 percent of those buildings that were damaged were destroyed. Also, 52 percent of the families in the area before the flood have not returned. In addition, only 74 families are being served for the $5.8 million cost. According to OSPD goals, this should be a relatively low priority project.

In Project 63, over 30 percent of the residential buildings and 50 percent of the non-residential buildings were destroyed. Approximately 20 percent of the non-destroyed damaged buildings are unrepairable

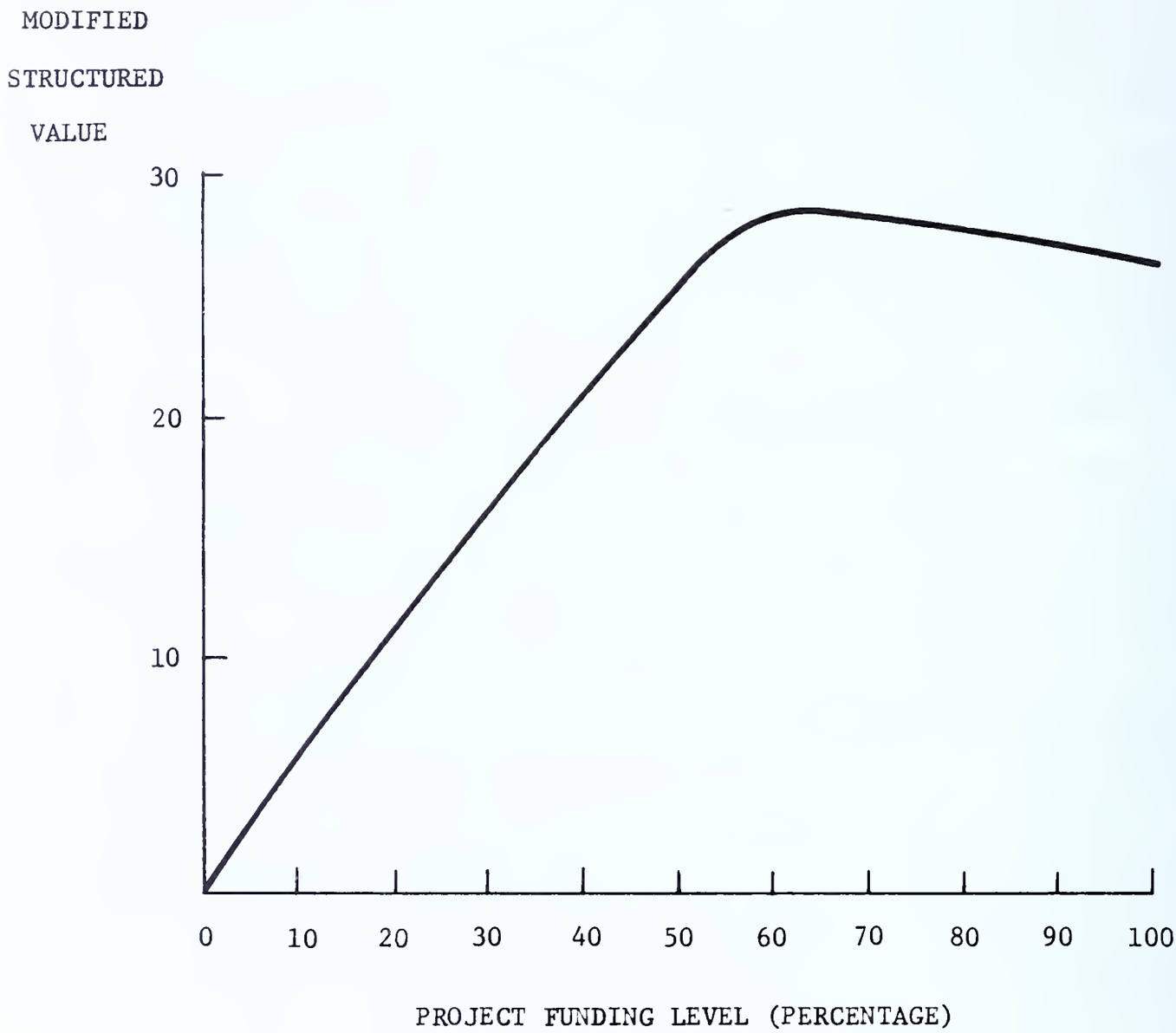

FIGURE 21
MODIFIED STRUCTURED VALUE VERSUS PROJECT FUNDING LEVEL

and require demolition. Thus, more than 50 percent of all pre-flood residential buildings are destroyed or in need of demolition. Only 41 percent of the pre-flood families remain in the area. This, too, by OSPD goals should be a low priority project.

Projects Selected for Funding by DP, but Not Funded Federally. Projects 41, 57 and 69 were rejected for federal funding but were selected for full funding using the OSPD criteria in the dynamic programming routine.

Project 41, Mill Hall, Clinton, has over 90 percent of the damaged buildings in the usable or usable but reparable categories. Over 94 percent of the pre-flood families have remained in the area. In addition, the project cost of $5.1 million for 309 families represents one of the smallest costs per family among the projects.

Project 57, Lewisburg, Union, has over 94 percent of the damaged buildings in a usable or unusable but reparable condition. More than 97 percent of the pre-flood families are still in the area. Here, 340 families can be served at a cost of only $5.3 million.

Project 69 has 100 percent of the families still in the project area and over 75 percent of the buildings in a damaged but usable condition. For a cost of $6.3 million, 306 families can be served.

Thus, it appears that all three projects can satisfy OSPD's goals and are worthwhile to fund.

Wilkes-Barre (Downtown), Luzerne. Project 23, Wilkes-Barre (Downtown), Luzerne, was not funded in the DP solution but had federally allocated funding at over two-thirds of the requested amount ($46.0 million out of the requested $65.8 million). This project has the fourth highest Structured Value primarily because 100 percent of the buildings were damaged or destroyed and 90 percent of the area is residential. However, only 27 percent of the

families remain in the area. The project cost is $65.8 million to serve these 510 families. This large cost for the number of families remaining makes the project undesirable. The money might be better spent elsewhere.

Even if the $65.8 million could be used to repair the area to the extent that the other 1,400 families could return, the project's Structured Value to Cost per Family Unit ratio would still rank only fifty-seventh (it presently is sixty-ninth). In this case, the project still does not appear worthwhile. In addition, this use would be contradictory to OSPD's goal of providing immediate housing for the people remaining in the area and not providing housing for people no longer in the area.

Major Difference Between Federal and DP Allocation. Table X shows the projects which were over 75 percent federally funded but were were not funded in the DP solution. As can be seen, each of the federally funded projects has less than 50 percent of the pre-flood families remaining in the area.

Table XI shows the projects which were over 88 percent funded in the DP solution, but which were not federally funded. As can be seen, in all but four cases, over 92 percent of the pre-flood families are still in the area. In the other four cases, 86 percent, 82 percent, 73 percent and 60 percent of the families have remained in the area.

Thus, it appears that at least one of the primary criteria used in not allocating federal funds to the projects might be the percent of families remaining in the area. If a large percentage remained, the project was not funded. If a small percentage remained, the project was funded.

This is contradictory to OSPD's goals for Disaster Urban Renewal.

TABLE X
FAMILIES REMAINING IN PROJECTS NOT FUNDED BY DP

PROJECT	PERCENT OF FAMILIES REMAINING	PERCENT OF REQUESTED FUNDS FEDERALLY ALLOCATED	PERCENT OF REQUESTED FUNDS ALLOCATED BY DP
1	43	92	0
14	41	77	0
22	17	72	0
23	27	70	0
24	48	126	0
32	20	88	0
58	18	94	0
63	41	104	0
73	48	100	0

TABLE XI
FAMILIES REMAINING IN PROJECTS NOT FEDERALLY FUNDED

PROJECT	PERCENT OF FAMILIES REMAINING	PERCENT OF REQUESTED FUNDS FEDERALLY ALLOCATED	PERCENT OF REQUESTED FUNDS ALLOCATED BY DP
3	99	0	100
13	100	0	100
15	95	0	100
29	97	0	100
30	98	0	100
31	96	0	88
36	82	0	89
41	94	0	100
45	86	0	100
50	60	0	100
52	100	0	100
57	97	0	100
64	73	0	100
67	92	0	100
69	100	0	100
75	100	0	100
77	100	0	100
78	97	0	100

SECTION IV

GUIDELINES FOR EVALUATING FLOOD PROTECTION PROJECTS

INTRODUCTION

Practically every community along the Susquehanna River suffered severe damage from flooding due to tropical storm Agnes. In the recent survey[16] of regional and local planning agencies, the most often articulated unmet need is for improved flood protection to prevent a recurrence of such a disaster.

Current plans of the U.S. Army Corps of Engineers (COE) are directed toward providing increased protection against flooding in the Wyoming Valley, Harrisburg and Lock Haven areas. However, considerable additional protection is also required for other communities in the flood ravaged areas in the central, northeastern and northern tier portions of the Commonwealth.

In evaluating a flood protection project, it should be realized that the COE's primary criterion for recommending a project for construction is the economical feasibility of the project, i.e., the benefits attributable to the project must outweigh the cost of the project. However, economic feasibility does not guarantee that the project is desirable from other viewpoints. Thus, all projects must be carefully reviewed and evaluated by state planners to insure that:

(a) The project is consistent, and not in conflict, with state and local goals and plans

(b) The project does not cause undesirable or adverse impacts on surrounding areas

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[16] Questionnaire to Determine Program Effectiveness, Needs, and Priorities for Flood Recovery, Office of State Planning and Development, Executive Office, Commonwealth of Pennsylvania, Harrisburg, Pennsylvania, March 1973.

(c) The Environmental Impact Statement is complete and accurate

(d) All realistic alternatives for implementation of the project have been considered and that the most desirable alternative is selected

(e) The feasibility or infeasibility of each alternative has been completely and accurately determined.

CONSISTENCY WITH STATE AND LOCAL GOALS AND PLANS

The project must be reviewed to insure that it satisfies the goals behind its design and that it does not cause conflicts with other goals and plans.

Points to be considered include:

(a) The desired degree of protection

One of the COE's basic principles of project formulation and justification is to "provide for a maximum excess of benefits, tangible and intangible, over costs."[17] However, a specific degree of protection may be desired instead of that degree of protection which maximizes the net benefits. If the project is designed to maximize benefits, the desired degree of protection may not be attained.

(b) Urban renewal requirements

Since urban renewal is the only practical means to restore many of the communities destroyed by the flood, it is imperative that in all such areas the project afford the protection necessary for approval of urban renewal applications. Urban renewal applications will not be approved without assurance that the area is protected from a

[17] Survey Investigations and Reports, EM 1120-2-101, U.S. Army Corps of Engineers.

recurrence of the flood and that a flood plain is legally established. In addition, "the Pennsylvania eminent domain code specifically prohibits the redevelopment of properties acquired through urban renewal in such (flood-prone) areas unless the new structures are flood-proofed or protected from future floods equal to or of lesser magnitude than the flood of record."[18] Thus, it is essential to insure that the project satisfies urban renewal flood protection requirements.

(c) Future development of the area

To determine the potential benefits from the project, a forecast is made of the future development of the area, with and without the project in existence. This forecast should be reviewed considering the following points.

(1) Consistency

Is the forecast consistent with the state and local plans for the area?

Does the projected future use of the flood plain allow for realistic development of the area based upon future land requirements, the future flood hazard, and future protection costs?

Does the project as designed preclude or affect any present or future development that is deemed necessary or desirable?

Is there an alternative design which is better suited to future plans and goals?

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[18] Survey Report, Wyoming Valley Flood Control, Susquehanna River, Pennsylvania, Department of the Army, Baltimore District, Corps of Engineers, Baltimore, Maryland, December 1972.

(2) Preservation of channel capacity

A specific flood channel capacity is required for the project to be effective and for its benefits to be realized. Since future encroachments on flood channels and floodways and future developments on the flood plain may restrict this channel capacity, measures will be required to preserve the flood channel capacity. Various measures, such as easements, engineering works and flood plain regulation, should be considered and their effects on development assessed.

(3) Changes to utilities

The project may require relocation or modification of railways, highways, bridges, pipelines, power plants, sewer systems, water systems, communication lines and power lines. The effect of such changes on development must be considered.

(4) Other enhancements

Future development may be enhanced if improvements are made in the utilities which are being built or changed by the project. Although the cost of betterments which exceed the minimum design required by the project has to be borne by local interests, such betterments may be desirable because it may be considerably more economical to incorporate them into the project than to make improvements at a later date. Also, the early implementation of the betterment may speed up desired development. Thus the project should be reviewed to determine whether betterments whose cost must be borne by local interests are a desirable addition to the project.

(d) Federal Flood Insurance

To qualify for Federal Flood Insurance, local governments have to enact effective zoning plans and other ordinances to prevent future development of floodways and to insure prudent use of the flood plain. The project design should be such that preventative measures can be readily applied. In fact, such measures should be incorporated into the project wherever possible. The section on alternative plans discusses preventive measures.

(e) Flood-Related Problems

Problems may exist which could negate the future effectiveness of the flood control project. Examples include the subsidence of levees and surface flooding from ground water in mine pools. There should be provisions in the project for rectifying the effects of such problems. All such problems have to be dealt with.

(f) Intangible Benefits

Projects which are not economically feasible may be approved if intangible benefits are such that the project is considered essential. If the project is not economically feasible, the intangible benefits should be reviewed to insure that all have been accounted for.

EFFECTS ON SURROUNDING AREAS

The effect of the project on localities and other projects outside the project area must be evaluated. If such an evaluation is not made, it is possible that while the project is reducing damages in one area, it is shifting them to another area.

For example, channel improvements and increased levee heights will most likely cause higher flood peaks further downstream. A study[19] has shown that the flood peak (maximum instantaneous discharge at a given location) from Agnes would have been about 12 percent greater at Sunbury if the levee at Wilkes-Barre had not been overtopped.

The effects, both upstream and downstream, to be determined include:

(a) Additional damages caused by the project

(b) Additional benefits from the project

(c) Impact on other flood control projects

(d) Impact on plans and goals in other localities.

ENVIRONMENTAL IMPACT STATEMENT

The National Environmental Policy Act of 1969 requires that an Environmental Impact Statement be made part of "every recommendation or report on proposals for legislation and other major federal actions significantly affecting the quality of the human environment."[20]

The Environmental Impact Statement for the flood control project has to be reviewed to insure that the environmental effects have been completely and accurately stated.

The impact statement must fully discuss the adverse and beneficial impacts of each alternative. Steps that can be taken to ameliorate or eliminate adverse effects should be described. In addition, adverse effects that cannot be avoided if the project is undertaken should be pointed out.

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[19] Ibid.

[20] Public Law 91-910, The National Environmental Policy Act of 1969, January 1, 1970.

The impact on the following resources and conditions has to be assessed:

(a) Environmental conditions

(1) Geology and soils

(i) Major land features

(ii) Mines

(iii) Land resources

(2) Water resources

(i) Surface water-drainage

(ii) Ground water

(iii) Water quality

(iv) Flood quality

(v) Water use

(3) Atmosphere

(i) Climate

(ii) Air quality

(4) Fish and wildlife

(5) Vegetation

(6) Noise

(b) Socio-economic conditions

(1) General development

(2) Land use

(3) Aesthetics

(4) Transportation

(5) Historic landmarks

(6) Tax revenues and property value

(7) Economic conditions and employment

(c) Irreversible and irretrievable commitments of resources

(d) The relationship between local short-term use of the environment and the maintenance and enhancement of long-term productivity.

ALTERNATIVE PLANS AND MULTIPLE USES

The project must be reviewed to ensure that all realistic alternatives for implementation have been considered and that the most desirable alternative is selected. Desirability is defined in terms of cost, impacts, degree of protection, and attainment of state and local goals.

Types of Alternatives

Flood damage prevention measures can be classified as either corrective measures or preventative measures.[21] Corrective measures are directed toward reducing the likelihood of future flooding. Preventive measures are directed toward the reduction or prevention of damages when flooding does occur.

Corrective measures include:

(a) Physical Barriers

(1) Dams and reservoirs

(2) Levees and floodwalls

(3) Pumping stations

[21] Guidelines for Reducing Flood Damages, U.S. Army Corps of Engineers, Vicksburg, Mississippi, May 1967.

(b) Channel Flow Improvements to Increase Channel Capacity

(1) Straightening, widening and deepening of channels

(2) Removal of obstructions from river and stream beds

(3) Stabilization of stream banks

(c) Watershed Treatment

(1) Reforestation

(2) Terracing

(3) Crop rotation

(4) Contouring

(d) Improved Flood Forecasting and Temporary Evacuation

(1) Local disaster planning

(2) Stockpiling of supplies

(3) Public information programs

(e) Flood Proofing

(1) Seepage control

(2) Sewer and utility adjustments

(3) Protective coverings

(4) Roadbed protection

(5) Raising structures above the flood plain

(6) Architectural design

Preventative measures include:

(a) Flood insurance of properties prone to flooding

(b) Flood plain regulation

(1) Local zoning ordinances

(2) Building codes and subdivision regulations

(c) Development of recreational areas and other open spaces in flood plains

(d) Reduced taxes for agricultural, open space and recreation lands in flood plains adjacent to developing communities

(e) Assurance of adequate bridge and roadway openings and heights above flood flows

(f) Evacuation and relocation from the flood plain.

Flood control projects should consist of a mix of corrective and preventative measures. Obviously, some of these corrective and preventative measures are outside the scope and purview of the flood control project. They can only be carried out independent of the project by local interests. However, the project plan should be reviewed to insure that there are not any alternatives which can provide the same or greater protection at a reduced cost or with greater benefits. This review is discussed in the next section on economic feasibility.

Multiple Purpose Uses

Multiple purpose uses of a flood prevention project involve the additional uses which can be made of the flood prevention project. Such uses may consist of power developments, irrigation developments, recreation, navigation, etc.

When a project has multiple uses, the cost of the project is allocated among the various uses. Since this reduces the cost attributed to the flood prevention portion of the project, multiple uses have the effect of increasing the feasibility of flood prevention projects. Consequently, the project should be reviewed to verify that all appropriate multiple uses have been considered.

ECONOMIC FEASIBILITY

Economic feasibility is the primary criterion for determining whether a flood prevention project is eligible for authorization. If the expected benefits do not outweigh the projected costs, the project will not be authorized unless there are compelling intangible benefits available. Also, economic feasibility is one of the main criteria used to select the design from among the various alternative plans.

Consequently, the determination of economic feasibility must be both accurate and complete. All applicable costs and benefits must be included and justification must be given for costs and benefits that have been intentionally excluded or allocated to other projects. The methods of appraisal and analysis should be commonly accepted ones and samples should be reviewed to insure they are thorough and accurate. Depreciation, interest rates, compound interest methods, amortization, estimated project economic life, etc., must be reviewed to verify that the values used are realistic. Also, flood discharge, stage, damage, and frequency relationships have to be verified.

Benefits should be determined for several scenarios. The benefits should be calculated for the area in its present state of development using each alternative plan. In addition, the benefits should be modified to account for the expected development of the area with and without the project.

The extent and amount of damages caused by a flood is dependent upon several factors, i.e., the height of the flood, the duration of the flood, the rate of the flood rise, the velocity of the flow and the amount of area flooded. For a given area, the probable value of these factors and the frequency of their occurrence can be determined using the area's hydrologic and geologic data.

Thus, the review of economic feasibility must not only consider economic data but must also consider the hydrologic and geologic data used to determine the expected degree of flooding.

The discussion which follows describes what to look for in the data to determine its accuracy and completeness. The following categories are discussed:

(a) Flood damage estimates

(b) Estimation of benefits from the flood prevention project

(1) Primary benefits

(2) Collateral benefits from multiple uses

(3) Negative benefits

(c) Project cost

(d) Hydrologic data.

Flood Damage Estimates

The probable, average annual primary flood damages are to be estimated at current prices. Estimates of damage should be made for the area in its present state of development with and without the flood protection project. The future development of the area with and without the project should be forecast and the damage estimates modified to account for this development. If appropriate, the forecast should account for changes in flood plain zoning. Since these damage estimates are used to determine the benefits of the project, the accuracy of the estimates and of the projected development must be verified.

Flood damages are grouped by two classifications, i.e., tangible damages and intangible damages. Each will be discussed below.

Tangible Damages.

Tangible damages consist of physical damages and losses, emergency costs, and business and financial losses. The evaluation of tangible damages should be made by standard methods, such as the cost of restoration (the repair cost or the replacement cost less depreciation), the comparative market or sales value, and the income or capitalization method.

Physical damages and emergency costs can most easily be evaluated by either of the first two methods. Crop losses are more readily evaluated by the third method. Business and financial losses must be derived from economic data.

When the damage estimates are made, non-recurring damages and damages which are deemed preventable by prudent management are excluded. Any such exclusion should be listed and made available for review.

Physical Damages. Physical damages include the following:

(a) Damages to land and improvements

  (1) Streets and roads
  (2) Dikes, levees and bridges
  (3) Utilities

(b) Damages to buildings

  (1) Public
  (2) Private

(c) Damages to the contents of buildings

  (1) Furnishings
  (2) Fixtures and machinery
  (3) Inventory

(d) Cost of clean-up (other than emergency clean-up and debris removal).

The technique for appraising physical damage should be reviewed to insure it is acceptable. Depreciation figures should also be verified.

Police, fire and military personnel will undoubtedly assist in emergency debris removal and clean-up activities. Additionally, existing programs, such as the U.S. Department of Labor's Operation Mainstream and Neighborhood Youth Corps Programs, may be temporarily directed towards debris clean-up. Such costs must not be double counted, i.e., once as physical damage and once as an emergency cost; however, such costs must be counted once.

When assessing physical damage, the lesser of the restoration cost or market value should be used if both can be applied. Otherwise, damages may be overestimated.

Emergency Costs. Emergency costs are those costs which under normal situations do not occur. They include:

(a) Emergency clean-up and debris removal
(b) Evacuation and reoccupation
(c) Flood fighting
(d) Increased cost of police, fire and military personnel
(e) Disaster relief
    (1) Temporary housing
    (2) Food stamps and commodity food programs
    (3) Temporary transportation
    (4) Clothing
    (5) Medical supplies
    (6) Household supplies
    (7) Occupational supplies
(f) Abnormal wear on alternative routes of travel
(g) Increased expense on normal operations during the flood
(h) Disaster Unemployment Assistance
(i) Increased unemployment compensation.

Emergency costs should not be derived by applying arbitrary percentages to the physical damage estimate. They should be determined through survey and analysis. All significant sources of emergency expenditures should be included. Specific sources will most likely include:

(a) American Red Cross
(b) U.S. Department of Housing and Urban Renewal
(c) Department of the Army
(d) Office of Emergency Preparedness
(e) General Services Administration
(f) U.S. Department of Agriculture
(g) U.S. Department of Labor
(h) Pennsylvania Department of Labor and Industry
(i) Pennsylvania Department of Environmental Resources
(j) Pennsylvania Department of Military Affairs
(h) Pennsylvania Department of Public Welfare.

Business and Financial Losses. Business and financial losses are the economic losses, other than physical damages and emergency costs, which result from a flood. Such costs include the net loss of normal profit and earnings suffered by businesses and individuals.

Business and financial losses do not exhibit a fixed relationship to physical damage and should not be obtained through the use of arbitrary percentages. The losses should be derived from independent economic data.

Losses that may be compensated for at a later date, such as postponed sales, will be excluded from the analysis. Also, all losses that may be compensated for, at any time, in an unaffected area, such as alternate sales by competitors, will be excluded. Such exclusions should be provided to be reviewed for accuracy.

To avoid double counting of individual income losses, unemployment compensation and Disaster Unemployment Assistance should be deducted from the income loss.

Intangible Damages

Intangible damages are those losses which cannot be given a monetary or market value (except possibly by assigning arbitrary values).

All intangible losses should be described. They should be reviewed to determine if it is possible to provide tangible values to them. Also, Commonwealth plans and goals should be reviewed to determine if intangible losses to proposed projects, either through delay or cancellation, exist and have not been included.

When intangible damages apply to assets under the jurisdiction of other federal or state agencies, such as archeological and historic resources, only a portion of the damage will be allocated to the flood prevention project. Such exclusions or allocations should be reviewed.

Estimation of Benefits from the Flood Protection Project

The probable, average annual values of all primary tangible benefits are to be estimated at current prices. Intangible benefits are to be described.

Benefits attributable to a flood prevention project consist of the primary flood control benefits and the increased utilization benefits. In addition, collateral benefits which are attributable to uses other than flood control are to be determined.

The primary flood control benefits are calculated as the difference between the probable, average annual flood damages expected without the project and the probable, average annual flood damages expected with the project. Secondary benefits consist of those gains which may result from the flood prevention project, but which are also attainable by means other than flood prevention. Secondary benefits are excluded from the project evaluation. Consequently, they should be identified and reviewed to verify that they are actually obtainable by other means.

A project may also cause adverse effects which result in negative benefits. The negative benefits are the increased costs necessary to remedy or overcome the adverse effect. Negative benefits are deducted from the project's positive benefits.

Benefits should be calculated for each alternative plan using the existing development with and without the project and using the expected future development with and without the project.

Tangible, intangible, collateral and negative benefits are discussed in the following paragraphs.

Tangible Benefits

Tangible benefits consist of the following:

(a) Primary flood control benefits
(b) Increased utilization benefits.

Primary Flood Control Benefits. The primary flood control benefit is the difference in the expected flood damage with and without the project. Since the benefit is calculated directly from the flood damage estimate, all comments on flood damage estimation also apply to primary flood control benefits.

Increased Utilization Benefits. Increased utilization (or enhancement) benefits result from an increase in the net earning power or market value of land which prior to the project has been undeveloped or only partially developed due to the flooding hazard. The determination of the increased utilization benefit requires a forecast of the probable utilization of the land. Such forecasts should be verified to ensure they are consistent with state and local goals and plans, especially future flood plain regulations.

In the analysis net increases in land earnings and increases in the capital or market value are reconciled with each other, using the long-term mortgage financing rate for the area. Benefits that develop

gradually or non-uniformly over the project life are reduced to an equivalent average annual value by compound interest methods. Consequently, the finance rates and interest rates used in the analysis have to be verified.

Furthermore, that portion of the increase in earning power which can be obtained only by investment in addition to the flood control project is excluded from the calculation. For example, the increased rental value of a property is an allowable benefit; however, the potential earnings of an unbuilt factory are not.

Additionally, double counting of benefits must be avoided in areas which will realize benefits from both a prevention of flood damages and an increased utilization value. If a portion of the increased utilization value is attributable to a reduction in flood damages, the utilization increase must be adjusted by the decrease in flood damage.

Intangible Benefits

Intangible benefits include:

(a) Prevention of loss of life
(b) Improvement of sanitation
(c) Prevention of epidemic
(d) Enhancement of the security of the people in the area
(e) Beautification
(f) Activities, such as recreation, for which only a partial monetary evaluation is possible.

Since intangible benefits may justify a project which is otherwise not economically feasible, all significant intangible benefits must be accounted for. State and local goals and plans should be consulted to determine if important potential intangible benefits have not been considered.

Collateral Benefits

Collateral benefits are those benefits which are attributable to water uses other than flood control. Collateral benefits include benefits to the following uses:

(a) Power
(b) Irrigation
(c) Navigation
(d) Water supply
(e) Sanitation
(f) Pollution abatement
(g) Fish and wildlife conservation
(h) Recreation.

Collateral benefits are evaluated to provide the means for allocating the cost of a flood control project among the various uses that will be made of the project. The existence of collateral benefits reduces the cost charged to the flood control portion of the project and thus makes the project more attractive economically.

Therefore, it is imperative that all potential collateral benefits be included in the project analysis. The methodology for allocating the project costs between the flood control project and the other water uses should be carefully reviewed.

Negative Benefits

Flood prevention projects may result in both beneficial and adverse effects. The adverse effects may be such that they can be remedied by additional expense during the construction of the project or may be such that they will exist throughout the life of the project.

Examples of adverse effects are as follows:

(a) Flood control effects on overland transportation

    (1) Greater clearance required for future bridge construction

(2) Increased operation and maintenance cost for bridges

(3) Increased cost of future highway construction

(i) Elevation of roadways over levees

(ii) Closure structures for roads through levees

(4) Increased cost of future vehicle operation.

(b) Effects of reservoirs

(1) Erosion, swamping or silting of channels, adjacent lands and stream banks due to sudden releases of water, backwater upstream and fluctuations of the reservoir pool

(2) Damage to navigation

(3) Damage to fish and wildlife

(4) Variations in the stoppage of flow affecting water supply.

(c) Channel improvements which increase peak flows downstream and, consequently, increase damage downstream

(d) Effects of levees

(1) Backwater effects upstream

(2) Backwater effects on the opposite bank

(3) Increased peak flow downstream.

(e) Construction which increases water, air and noise pollution in the area.

The cost of remedying adverse effects during construction should be added in as part of the construction cost. The probable, average annual cost of all other negative benefits should be deducted from the probable, average annual benefits attributable to the project.

It is imperative that negative benefits be accounted for; otherwise, the benefits of the project will be overstated.

Project Cost

The project cost consists of the first costs and the annual costs of operating and maintaining the project. The costs have to be developed for each alternative plan. Costs should be calculated at current prices.

First costs include:

(a) Construction
    (1) Levees and closure structures
    (2) Bridges
    (3) Pumping stations
    (4) Reservoirs
    (5) Channel modification
(b) Land and easements
(c) Beautification
(d) Contingency costs
(e) Engineering and design
(f) Supervision and administration
(g) Evaluation.

To be meaningful, the first costs have to be amortized over the economic life of the project. The interest rate used for amortization and the estimated project life must be verified.

Operating and maintenance costs include:

(a) Annual interest payments
(b) Manpower
(c) Repairs and replacements.

Hydrologic Data

The hydrologic data is used to determine the frequency, extent, duration, velocity, and rate of rise of the flood threat. This information is used to make damage assessments for the project area with

the various alternative flood control plans in effect and without them. Since this assessment determines if the project is feasible and which alternative design is selected, it is essential that the hydrologic data be complete and accurate.

The hydrologic data include:

(a) Climatology
(b) Streamflow and runoff
(c) Floods of record
(d) Flood frequency
(e) Standard project flood
(f) Description of the project area.

Climatology

Climatology data should consist of information about the precipitation, storms and temperature in those areas which affect the project area. The temperature and rainfall stations used to provide the data should be reviewed to insure that all appropriate stations have been included.

The following data are necessary:

(a) Rainfall
    (1) Average
        (i) Annual
        (ii) Monthly
    (2) Extreme
        (i) Highest and lowest annual
        (ii) Highest and lowest monthly
        (iii) Highest 24-hour
(b) Snowfall
    (1) The same type of data as for rainfall
    (2) The snowmelt temperature, if different than $32^{o}F$

(c) Temperature

The same type of data as for rainfall

(d) Major storm characteristics

(1) Time of year
(2) Direction of movement
(3) Precipitation
(4) Special characteristics, such as prevailing high or low pressure areas.

Streamflow and Runoff

Streamflow and runoff data are required to determine the normal conditions of the streams. The data should include the river stage and stream-gaging stations used to provide the data to insure that all available data have been included.

The data consist of the following:

(a) Average stage and discharge records

(1) Daily average by month
(2) Annual average

(b) Extreme stage and discharge records

(1) Daily extreme by month
(2) Record annual daily extremes

(c) Total flood volume.

Floods of Record

Information about the floods of record is required to verify the flood frequency. It can also be used to determine if floods can be categorized by cause, such as hurricane and non-hurricane flooding.

Data should include:

(a) Date

(b) Height

(c) Maximum discharge

(d) Duration volume (runoff in inches over the drainage area).

If precise measurements are not available, the assumptions behind the calculated discharge should be verified. This includes checking high water marks and routing criteria.

Standard Project Flood

"The standard project flood is an estimated or hypothetical flood that might be expected from the most severe combination of meteorological and hydrological conditions that are considered reasonably characteristic of the geographical region involved, excluding extraordinarily rare combinations."[22]

The standard project flood plain limits are prepared to determine the area over which to estimate flood damages.

Description of the Project Area

The description of the area should include:

(a) Location and extent

(b) Topography

(c) Geology and soils

    (1) Suitability of foundations for the flood prevention structures considered

    (2) Availability of construction materials

    (3) Mineral resources affected

    (4) Floors and linings of reservoirs

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[22] Survey Report, Wyoming Valley Flood Control, Susquehanna River, Pennsylvania, Department of the Army, Baltimore District, Corps of Engineers, Baltimore, Maryland, December 1972.

(d) Stream characteristics

(1) Slopes

(2) Channel capacities

(3) Cross-sectional dimensions

(e) Flora and fauna of the area.

SECTION V

FLOOD DAMAGE/RECOVERY DATA BASE

INTRODUCTION

On July 18, 1972, less than one month after Tropical Storm Agnes, efforts were started to develop a long-range flood recovery plan for the Commonwealth of Pennsylvania. The major thrust of the recovery task is reflected by the state's commitment to a planning effort which has comprehensive intergovernmental participation and comprehensive coverage of social, economic and physical factors in planning the recovery effort.[23] By the end of August, the Office of State Planning and Development (OSPD) prepared a "Work Program for Flood Recovery Planning" and submitted it to the Federal Regional Council for approval and funding. Approval and funding were received in November. Subsequent to the approval, OSPD tasked MITRE to conduct a study to design a Flood Damage/Recovery Data Base and to identify potential data sources. This section documents the results of that study.

NEED FOR DATA

Since both the Commonwealth and the various regions are developing flood recovery plans, there is a need to have a centralized data base for use by all parties in developing these plans. A centralized data base will foster the development of compatible plans and also encourage a closer working relationship among the regions, local governments, and OSPD.

The data needs of OSPD are further substantiated by the Federal Regional Council which stated that the state should gather information to make an overal assessment of where damage occured; determine what

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[23] Letter to Mr. A. Edward Simon, Director, Office of State Planning and Development, from Mr. Theodore Robb, Chairman, Federal Regional Council, July 26, 1972.

was damaged and the extent of the damage, and establish standards for uniform information gathering and submit them to areawide and local agencies.[24]

It is worth noting that two Federal Regional Councils, Region I (Boston) and Region VI (Dallas), are presently developing Regional Management Information Systems (RMIS). Part of this system will be available to all regions in 1974. The details of the system have not been specified; however, it appears that it will have the capability to provide some of the data for the Flood Damage/Recovery Data Base described. Although the RMIS will not be available for more than a year, its capabilities and progress should be monitored by those responsible for the operation and maintenance of the Flood Damage/Recovery Data Base.

GUIDELINES AND SCOPE

The Flood Damage/Recovery Data Base described in this section has been developed using the following guidelines:

(a) it should rely as much as possible on existing data
(b) it should be flexible, so that it can easily be modified and expanded to handle new data required for the planning effort and data required for other planning efforts such as the long-range comprehensive investment plan
(c) it should support OSPD's data requirements for development of a long-range flood recovery plan
(d) it should provide OSPD with the capability of monitoring the recovery effort on a timely basis
(e) it should be capable of supporting regional and local planning efforts.

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[24] Letter to Howard S. Grossman, Executive Director, Economic Development Council of Northeastern Pennsylvania, Inc., from David D. Longmaid, Director, Planning Division, Federal Regional Council, September 8, 1972.

The first guideline, use existing data as much as possible, was employed primarily to minimize the cost of developing the data base. Any effort to develop data "from scratch" would, in general, be expensive.

Any data base used for planning purposes must be flexible. It must be easily modified or expanded to facilitate any changes in data required in the planning process. Flexibility is also desirable since development of a Flood Damage/Recovery Data Base would provide the basis for developing a planning data base to support all Commonwealth planning efforts. However, to be able to perform this function would require significant expansion. This guideline was a major factor in the design of the data base structure and the selection of means of implementing the data base.

The last three guidelines, in effect, reflect the functions to be fulfilled by the data base. The application of these guidelines in the development of the data base design was subjective. No rigorous requirements analysis was conducted; hence, only a preliminary data base design is presented. If implemented, it may provide an interim planning capability and form the basis for conducting a much needed requirements analysis.

The scope of the study was limited to the identification and evaluation of data which is not contained in standard statistical abstracts published on a regular basis, such as the Pennsylvania Abstract, Crop and Livestock Annual Summary, U.S. Government Printing Office publications, etc. The planning community is aware of these data sources, and any data elements based upon these sources can be easily added to the data base if desired. In addition, data contained in these reports is, in general, not timely. For example, the Pennsylvania Abstract containing 1970 data is not published until the Spring of 1972, a little more than a year after the data are available.

The scope of the study was further limited only to the identification of potential data sources. No attempt was made to collect data, to identify specific data formats or to systematically evaluate the quality and compatibility of the data from the various sources. However, several problems were identified during the course of the study and are discussed in this section.

METHODOLOGY

The methodology followed in this study consisted of the following six steps:

(a) Develop a preliminary data base design

(b) Identify potential data sources

(c) Conduct preliminary interviews with potential data sources

(d) Finalize data base design

(e) Conduct follow-up contacts and interviews with potential data sources

(f) Evaluate data sources.

The first step in the methodology was to develop a preliminary data base design. Normally, a data base design would be based upon a detailed requirements analysis; however, in this situation it appeared to be more efficient to design an idealized data base and use this design as a basis for conducting the interviews specified in Step (c). The cost of conducting a requirements analysis as an initial step was not warranted in the design of the data base, since one of the guidelines specified for the study was to restrict, as much as possible, the data base to data available from existing sources. A requirements analysis, of course, is needed; however, it can be conducted using the design presented in this paper as a point of departure.

The second step in the methodology was to identify potential data sources. This step consisted of the following three efforts:

(a) A review of all federal and state agencies which participated in the emergency relief and immediate recovery efforts was made. Agency involvement in the flood recovery and interrelationships among agencies were identified.

(b) The Pennsylvania budget document and its associated program measures were reviewed to identify data sources for the flood impact and recovery monitoring section of the data base design developed in Step (a).

(c) During the conduct of interviews of sources identified in (a) and (b) above, additional sources were identified and interviews were conducted.

Thirty-three potential sources were identified in this process. The scope of the study was limited to evaluating these sources. There was no attempt to evaluate standard statistical publications such as the Pennsylvania Abstract or U.S. Bureau of the Census publications.

With the preliminary data base design established in Step (a), each of the potential data sources identified in Step (b) were contacted and appropriate knowledgeable individuals were interviewed. The primary purpose of these preliminary interviews was to identify, in broad terms, the data available within the particular organization. In general, these interviews were conducted at a high level in the organization.

Step (d) is based upon the findings of the preliminary interviews. The data base developed in Step (a) was modified to more closely conform with the data available from the 33 sources contacted. This revised data base is the design presented in this paper.

Using the revised data base developed in the preceding step, follow-up contacts with the potential data sources were made and, when possible, detailed specifications of the data available obtained. In general, these contacts were made with individuals responsible for maintaining the data. In cases where the data are automated, responsible individuals in the data processing section of the agency were interviewed.

The final step in the methodology was to evalute the data sources. Those data elements for which there was only one data source required no evaluation. However, in many cases more than one data source was identified for a specific data element. For such instances a ranking scheme was developed and used to evaluate the multiple sources.

DATA BASE DESIGN

The Flood Damage/Recovery Data Base design is based upon an informal evaluation by MITRE of data needs for the long-range recovery plan, discussions with OSPD personnel, and comments received during interviews with potential data sources. However, the data base design is relatively complete and could provide the basis for performing a requirements analysis and at the same time could be used in the initial design and implementation of the data collection system.

In designing the data base, primary consideration was given to the functions which the data base is to perform; the data base is to provide a basis for the development of a statewide long-range flood recovery plan, to support regional planning efforts, and to aid in monitoring the recovery effort.

The data base is separated into three sections:

(a) Damage Data

(b) Recovery Expenditures

(c) Flood Impact/Recovery Monitoring.

Each of these sections is described in detail in the following paragraphs and in the discussion on the data base implementation.

Damage Data

The Damage Data Base is oriented towards real property damage. Indirect damage expenditures and damage related expenditures are not included in this section; however, they are accounted for, either directly or indirectly, in the other two sections of the data base.

The structure of the Damage Data Base is shown in Figure 22. Data are aggregated at the county level. A total damage estimate for the county is obtained for both private and public damage. The structure of the Damage Data Base differs significantly for private and for public damage.

Damage to private real property is separated into fifteen categories by type of business activity. Private households are included as one of these activities. Damage to the property of each activity is further separated into four damage categories: land and improvements; buildings; fixtures and machinery; and inventory. Based upon the review of data sources, this level of detail is all that is available from existing sources. However, if other sources should be identified or if efforts are pursued to develop greater detail from existing sources, it would be possible to expand the level of detail within the framework of this structure. This possibility is indicated in Figure 22 by the dashed lines which show a possible structure with two additional levels of detail below the land and improvements level. The first of these additional levels is a categorization of land improvements damage into four groups: erosion, landscaping, parking lots and fencing. The figure also shows a level of detail below landscaping where damage has been categorized by trees, shrubs, and ground cover.

On the public side, the structure is not quite as detailed. Public damage is divided into only five activities: streets and roads, dikes and levees, public buildings, public utilities, and facilities under construction. This structure which is far from ideal is dictated primarily by the form of the data available from the data sources reviewed. Any effort to develop a structure different from the one presented would entail an expensive data collection effort. Such an effort would entail a manual review and tabulation of information on over 18,000 Damage Survey Reports which were prepared immediately after the flood.

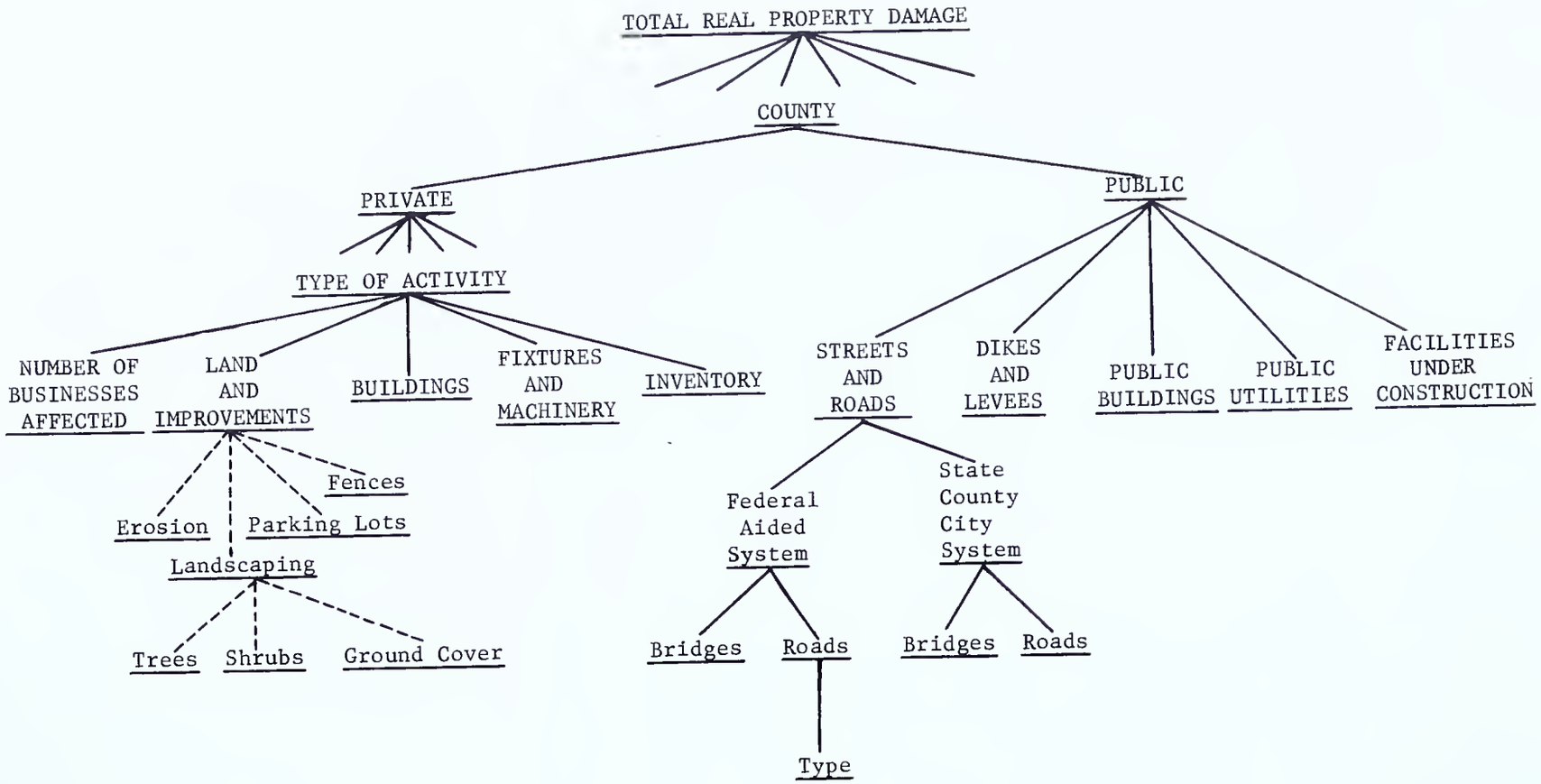


FIGURE 22
STRUCTURE OF REAL PROPERTY DAMAGE DATA

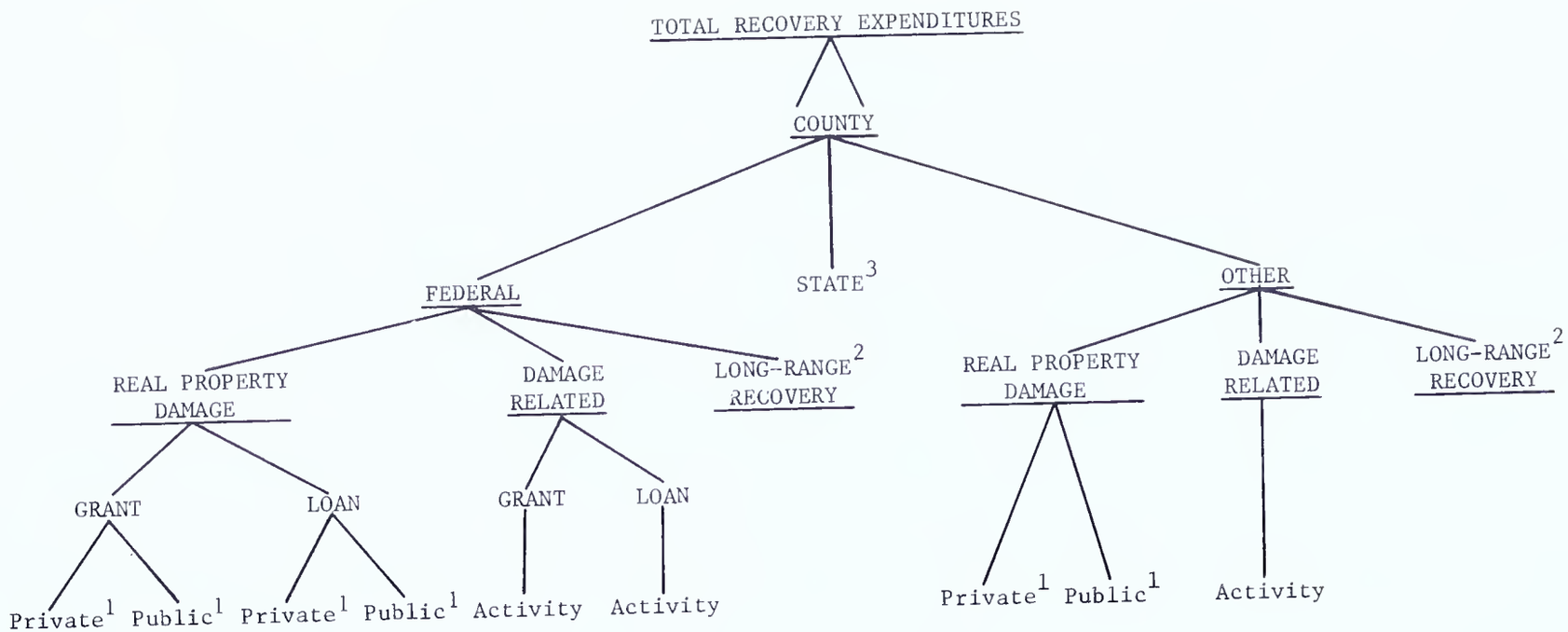
Of the five categories for damage to public property, only one has a further level of detail available, i.e., streets and roads. This is due primarily to the fact that streets and roads were repaired from federal funds supplied by two different agencies. The Department of Transportation supplied funds to repair the federally-aided highway system and the Office of Economic Opportunity supplied funds for the repair of state, county and city roads. For the federally-aided system further detail is available. As a result, total damage to the federally-aided system is separated into bridges and roads. Roads are further separated by type of road. For the state, county, and city systems, damage can be classified as either bridge damage or road damage.

Recovery Expenditures

The structure for the second section of the data base, Recovery Expenditures, is presented in Figure 23. Recovery expenditure data are aggregated at the county level and categorized by whether the expenditure came from the Federal Government, the state government, or other sources.

Federal recovery expenditures were classified as real property expenditures, damage-related expenditures, and long-range recovery expenditures. Long-range recovery expenditures consist of programs such as urban renewal and are discussed in the Flood Impact/Recovery Monitoring data section. The real property recovery expenditures are further classified into either grant or loan type of expenditures. The real property expenditures are separated into the same fifteen private and five public activities used for the Damage Data Section. This structure permits one to easily identify needs in terms of damage not compensated for by recovery expenditures.

The damage related expenditures are also classified into either grant or loan types of expenditures. It will be noted that the Damage Data Section does not contain damage data which correspond to



[1]Below this point, the structure is identical to that shown in Figure 1.

[2]Data for this element is contained in the Flood Impact/Recovery Monitoring Section of the data base.

[3]Structure for the State is identical to the Federal structure.

FIGURE 23
STRUCTURE OF RECOVERY EXPENDITURE DATA

the damage related expenditures portion of the Recovery Expenditure Section. This resulted because no formalized effort was made to actually assess the damage associated with these expenditures as was done for real property damage. Because of this, these indirect damages must be assumed to be equal to the damage-related expenditures.

The state expenditures have a structure identical to the federal structure.

The other expenditures also have a structure identical to the federal structure, except that no distinction is made between grants and loans.

Flood Impact/Recovery Monitoring

The Flood Impact/Recovery Monitoring section of the data base is essentially a series of data elements repeated over time. It consists of over 200 indicators grouped into 23 activities, each activity having approximately nine indicators. In general, data will be collected by county for each quarter beginning with 1971 and continuing through 1975; of course, continuation beyond 1975 is feasible,if desired. Collection of data on a quarterly basis is established mainly as a guideline. Part of the data are available only on an annual basis.

A listing of the indicators by activity is presented in Table XII. The first 15 groups of indicators are associated with business activity. These activities are identical to the 15 used in the real property damage section of the data base. The indicators associated with these activities are primarily economic (e.g., sales, profit, etc.). The next three groups of indicators are associated with federal, state, and local governmental activities with respect to the flood recovery effort. The federal and state activities are associated with expenditures directed toward the recovery, whereas the local government indicators are associated with the local government's financial stability.

TABLE XII
FLOOD IMPACT/RECOVERY MONITORING INDICATORS

BUSINESS ACTIVITY INDICATORS

(1) Agriculture

Number of farms
Livestock value
Crop value
Dairy production
Total income
Average income
Farm population
Employment

(2) Mining

Number of firms
Sales
Net income
Wages and salaries
Capital expenditures
Employment
Witholding taxes
Cost of goods sold

(3) Manufacturing

Number of firms
Sales
Net income
Wages and salaries
Capital expenditures
Employment
Witholding taxes
Cost of goods sold

TABLE XII (CONTINUED)
FLOOD IMPACT/RECOVERY MONITORING INDICATORS

BUSINESS ACTIVITY INDICATORS (Continued)

(4) Construction

- Number of firms
- Sales
- Net income
- Wages and salaries
- Capital expenditures
- Employment
- Witholding taxes
- Cost of goods sold
- Residential
  - Demolition permits
    - Number of housing units
  - Building permits
    - Number of housing units
  - Utility hook-ups
- Non-residential
  - Demolition permits
    - Floor space (sq. ft.)
      - Manufacturing
      - Warehouses
      - Office
      - Retail
  - Building permits
    - Floor space (sq. ft.)
      - Manufacturing
      - Warehouses
      - Office
      - Retail
  - Utility hook-ups

(5) Transportation

- Number of firms
- Sales
- Net income
- Wages and salaries
- Capital expenditures
- Employment
- Witholding taxes
- Cost of goods sold

TABLE XII (CONTINUED)
FLOOD IMPACT/RECOVERY MONITORING INDICATORS

BUSINESS ACTIVITY INDICATORS (Continued)

(6) Communications

Number of firms
Sales
Net income
Wages and salaries
Capital expenditures
Employment
Witholding taxes
Cost of goods sold
Number of customers

(7) Electric Services

Number of firms
Sales
Net income
Wages and salaries
Capital expenditures
Employment
Witholding taxes
Cost of goods sold
Number of customers

(8) Gas Services

Number of firms
Sales
Net income
Wages and salaries
Capital expenditures
Employment
Witholding taxes
Cost of goods sold
Number of customers

(9) Sanitary Services

Number of firms
Sales
Net income
Wages and salaries
Capital expenditures
Employment
Witholding taxes
Cost of goods sold
Number of customers
Number not meeting water quality standards

TABLE XII (CONTINUED)
FLOOD IMPACT/RECOVERY MONITORING INDICATORS

BUSINESS ACTIVITY INDICATORS (Continued)

(10) Water Services
- Number of firms
- Sales
- Net income
- Wages and salaries
- Capital expenditures
- Employment
- Witholding taxes
- Cost of goods sold
- Number of customers
- Number not meeting water quality standards

(11) Steam Heat Service
- Number of firms
- Sales
- Net income
- Wages and salaries
- Capital expenditures
- Employment
- Witholding taxes
- Costs of goods sold
- Number of customers

(12) Trade
- Number of firms
- Sales
- Net income
- Wages and salaries
- Capital expenditures
- Employment
- Witholding taxes
- Costs of goods sold
- Number reporting sales
- Sales reported
- New applications
- Modified applications
- Number of corporations reporting sales

TABLE XII (CONTINUED)
FLOOD IMPACT/RECOVERY MONITORING INDICATORS

BUSINESS ACTIVITY INDICATORS (Continued)

(13) Services
- Sales
- Net income
- Wages and salaries
- Capital expenditures
- Employment
- Witholding taxes

(14) Financial, Insurance and Real Estate
- Number of firms
- Net income
- Wages and salaries
- Capital expenditures
- Employment
- Witholding taxes
- Amount of savings
- Number of accounts
- Amount of demand deposits
- Number of accounts
- Amount of loans
- Number of loans

(15) Private Households
- Unemployment
- Number displaced
- Number in temporary housing
- Number returned to original homes
- Number moving to other locations
- Social/economic data from HUD data base

GOVERNMENT ACTIVITY INDICATORS

(16) Federal Government
- Expenditures Proposed
- Expenditures Approved
- Actual Expenditures
- Loans Outstanding

(17) State Government
- Expenditures Proposed
- Expenditures Approved
- Actual Expenditures
- Loans Outstanding

TABLE XII (CONTINUED)
FLOOD IMPACT/RECOVERY MONITORING INDICATORS

(18) Local Government

Tax Base
Tax Revenues
Expenditures

SOCIAL/ECONOMIC ACTIVITY INDICATORS

(19) Criminal Offenses

Robbery
Aggrevated assault
Burglary

(20) Health

Short term hospital beds available
Long term hospital beds available
Cases eligible for medical assistance
Cases certified eligible for medical assistance
Cases receiving medical assistance
State mental institutions (cases over 65)
State hospital average population
Persons receiving life support services
Polluted surface waters (miles)
Polluted ground waters (sq. miles)
Unsatisfactory solid waste disposal sites

(21) Intellectual Development

Children eligible for pre-school education
Pre-school enrollment
Pupils eligible for educational program services
Elementary and secondary educational program enrollment

(22) Social Development

Population under 18
Number receiving welfare services
Families needing homemaker services
Families receiving homemaker services

TABLE XII (CONCLUDED)
FLOOD IMPACT/RECOVERY MONITORING INDICATORS

(23) Economic Development

Advertisement responses
Industrial projects
PIDA projects
Community facility projects
Site development projects
New employment opportunities
PIDA financed employment opportunities
Number receiving cash grants
Number below poverty level
Number leaving assistance calls
Number on unemployment compensation
Number in instructional courses
Number completing courses
Number placed in jobs
Percent of unemployed placed in jobs
Substandard dwelling units
Families in substandard units
New dwelling units due to state efforts
Rehabilitated units due to state efforts
Dwelling units raised to code standards
Federal projects receiving state aid
Local projects receiving state aid
Damage caused by soil erosion

The remaining groups of indicators are associated with what might be classified as social or non-economic indicators. These were developed primarily from a review of the program measures used as a basis for evaluating and justifying budget items within the Pennsylvania Budget. Since they indirectly reflect the goals and objectives of the state, it is felt that they similarly will be good indicators of the recovery effort. This is especially true if the long-range flood recovery planning effort is eventually integrated with the Pennsylvania Planning, Programming and Budgeting System.

DATA BASE IMPLEMENTATION OPTIONS

The Flood Damage/Recovery Data Base described above can be implemented either as a manual system or as a computerized one. The system selected will depend upon the funds available, the anticipated use of the system, and the flexibility desired in terms of detail and report preparation. A framework for implementing either of the systems is described below. For the manual system, forms for maintaining the system are presented and their use described. For the computerized system, a file structure is presented and examples of typical reports are given.

Manual Data Base

The manual data base structure consists of two separate data files. The two files are the Damage/Recovery Expenditure Summary (DRES) and the Flood Impact/Recovery Monitoring Summary (FIRMS).

Damage/Recovery Expenditure Summary

The Damage/Recovery Expenditure Summary (DRES) is a generalized record which indicates for specific activities both the damage caused by the flood and the flood recovery expenditures. The damage and recovery data are grouped into one record to enable a direct comparison of damage that occurred and the recovery effort directed toward that damage.

Structure. Table XIII gives the format for DRES. Flood damage is separated into four categories:

(a) land improvements
(b) buildings
(c) fixtures and machinery
(d) inventory.

Since the data base is a generalized structure, all damage categories do not necessarily apply to each activity being assessed. For example, when measuring damage to streets and roads only the Land and Improvements category applies.

In addition to the damage categories shown in Table XIII, the number of items affected in each activity is recorded. The units vary according to the activity being measured. For agriculture, number refers to the number of farms affected. For streets and roads, number refers to the miles of streets and roads closed as a result of the damage.

Flood recovery expenditures are separated into five categories:

(a) federal grants
(b) federal loans
(c) state grants
(d) state loans
(e) other.

The recovery data will indicate the cumulative recovery expenditures at each point in time.

The activities listed in Table XIII represent the highest level of aggregation for damage and recovery data. Depending on the data available, it may be possible to input activity data at a lower level of aggregation. For example, trade could be partitioned into the following groups (using 2-digit SIC Codes):

TABLE XIII
DAMAGE/RECOVERY EXPENDITURE SUMMARY

AREA _____ (STATE, REGION, COUNTY, ZIP CODE)

AS OF DATE _____

ACTIVITY / DAMAGE CATEGORY/RECOVERY EXPENDITURES	NUMBER DAMAGED	DAMAGE (IN $1000)					RECOVERY EXPENDITURES (IN $1000)					
							FEDERAL		STATE		OTHER	TOTAL
		LAND AND IMPROVEMENTS	BUILDINGS	FIXTURES & MACHINERY	INVENTORY	TOTAL	GRANT	LOAN	GRANT	LOAN		
REAL PROPERTY (Continued)												
PUBLIC												
STREETS AND ROADS - FEDERALLY AIDED SYSTEM												
STREETS AND ROADS - STATE/COUNTY/CITY OWNED												
DIKES AND LEVEES												
PUBLIC BUILDINGS												
PUBLIC UTILITIES												
FACILITIES UNDER CONSTRUCTION												
OTHER												
FLOOD RELATED DAMAGE EXPENDITURES												
DEBRIS REMOVAL												
EMERGENCY RESCUE AND RELIEF												
PROTECTIVE MEASURES												
TEMPORARY HOUSING												
TEMPORARY BUS SERVICE												
FOOD STAMPS												
COMMODITY FOODS												
DISASTER UNEMPLOYMENT ASSISTANCE												
WORK PROJECTS												
OTHER												

TABLE XIII (CONCLUDED)
DAMAGE/RECOVERY EXPENDITURE SUMMARY

AREA _____ (STATE, REGION, COUNTY, ZIP CODE)

AS OF DATE _____

ACTIVITY / DAMAGE CATEGORY/RECOVERY EXPENDITURES	NUMBER DAMAGED	DAMAGE (IN $1000)					RECOVERY EXPENDITURES (IN $1000)					
							FEDERAL		STATE		OTHER	TOTAL
		LAND AND IMPROVEMENTS	BUILDINGS	FIXTURES & MACHINERY	INVENTORY	TOTAL	GRANT	LOAN	GRANT	LOAN		
REAL PROPERTY												
PRIVATE												
AGRICULTURE												
MINING												
CONSTRUCTION												
MANUFACTURING												
TRANSPORTATION												
COMMUNICATIONS												
ELECTRIC SERVICES												
GAS SERVICES												
SANITARY SERVICES												
WATER SERVICES												
HEAT SERVICES												
TRADE												
FINANCE, INSURANCE, REAL ESTATE												
SERVICES												
NON-PROFIT MEDICAL												
NON-PROFIT EDUCATION												
PRIVATE HOUSEHOLDS												

(a) wholesale trade

(b) building materials, hardware, and farm equipment dealers

(c) retail trade - general merchandise

(d) food stores

(e) automotive dealers and gasoline service stations

(f) apparel and accessory stores

(g) furniture, home furnishing, and equipment stores

(h) eating and drinking places

(i) miscellaneous retail stores.

The other activities similarly could be broken into their component groups. Of course, using this level of detail will require additional forms with appropriate changes in the activity names. Increasing the level of detail will also increase the work load required to update and maintain the data base.

Data Input. The damage data will be input on a one-time basis. If improved damage data become available, then the individual data element forms can be updated. However, there should be no requirement for a periodic update of the entire damage portion of the record.

The recovery expenditures data will be updated periodically. (To be useful, this update should occur with the same frequency as the update of the FIRMS record, say, quarterly.) Since the recovery expenditures will decrease as time progresses, the recovery expenditures data will eventually stabilize. At such time, the recovery data will become useful as a reference as to what was done to promote the recovery of each activity and to identify possible unmet needs.

There are several possible levels at which to input the data. The data may be entered at the zip code, county, region, or state level. In deciding the level to be used, both the availability of data at each level and the amount of data to be entered must be considered.

Since this is a manual data base, the amount of data entered and the ability to use these data meaningfully must be assessed.

Table XIV indicates the amount of data that must be input during the first year at each level of detail, assuming the level of activity aggregation shown on the form is used. For this calculation it was assumed that the recovery data would be updated quarterly during the first year and that the damage data would be entered once. This table actually overstates the damage data load, since it was assumed that each activity will use each damage category. After the first year, the damage data input will be negligible and the immediate recovery data input will decrease.

Table XV indicates the amount of data to be entered if the private activities are broken into their component groups by 2-digit SIC Codes. As can be seen, the data loads increase by about a factor of three.

If one assumes that an individual could enter 100 data elements per hour, it would require almost one man-year of effort to develop and maintain the DRES portion of the data base at the county and 2-digit SIC level of detail. This of course, does not include any time required to develop summary reports and handle special requests for data.

Flood Impact/Recovery Monitoring Summary

The Flood Impact/Recovery Monitoring Summary (FIRMS) provides a record of the growth or contraction of specified activities over a period of time. The record will show how growth or contraction was progressing before the flood occurred, how it was affected by the flood, and how it has progressed since the flood. Table XVI presents the format for FIRMS.

A total of 23 different activities are monitored. Each activity is assessed by the use of indicators which describe the activity. These indicators are measured as often as quarterly. When data availability permits, the time frame for the measurement commences with the

TABLE XIV
AMOUNT OF DATA INPUT INTO DRES THE FIRST YEAR
AT THE HIGHEST LEVEL OF ACTIVITY AGGREGATION

SOURCE LEVEL	DAMAGE DATA ENTRIES	RECOVERY DATA ENTRIES
Zip Code	126,000	720,000
County	8,442	48,240
Region	1,260	7,200
State	126	720

TABLE XV
AMOUNT OF DATA INPUT INTO DRES THE FIRST YEAR
AT ACTIVITY GROUP LEVEL OF AGGREGATION

SOURCE LEVEL	DAMAGE DATA ENTRIES	RECOVERY DATA ENTRIES
Zip Code	480,000	2,136,000
County	32,160	143,112
Region	4,800	21,360
State	480	2,136

TABLE XVI
FLOOD IMPACT/RECOVERY MONITORING SUMMARY

AREA _____ (STATE, REGION, COUNTY, ZIP CODE)

YEAR/QUARTER / ACTIVITY/INDICATOR	1971					1972					19 . . . 74					1975				
	1	2	3	4	TOTAL	1	2	3	4	TOTAL	1	2	3	4	TOTAL	1	2	3	4	TOTAL
AGRICULTURE																				
Number of Farms																				
Livestock Value																				
Crop Value																				
Dairy Production																				
Total Income																				
Average Income																				
Farm Population																				
Employment																				
. . .																				
MINING																				
Number of Firms																				
Sales																				
Net Income																				
Wages and Salaries																				
Capital Expenditures																				
Employment																				
Witholding Taxes																				
Cost of Goods Sold																				
. . .																				

TABLE XVI (CONTINUED)
FLOOD IMPACT/RECOVERY MONITORING SUMMARY

AREA _____ (STATE, REGION, COUNTY, ZIP CODE)

YEAR/QUARTER / ACTIVITY/INDICATOR	1971					1972					19 . . . 74					1975				
	1	2	3	4	TOTAL	1	2	3	4	TOTAL	1	2	3	4	TOTAL	1	2	3	4	TOTAL
MANUFACTURING																				
Number of Firms																				
Sales																				
Net Income																				
Wages and Salaries																				
Capital Expenditures																				
Employment																				
Witholding Taxes																				
Cost of Goods Sold																				
CONSTRUCTION																				
Number of Firms																				
Sales																				
Net Income																				
Wages and Salaries																				
Capital Expenditures																				
Employment																				
Witholding Taxes																				
Cost of Goods Sold																				

TABLE XVI (CONTINUED)
FLOOD IMPACT/RECOVERY MONITORING SUMMARY

AREA _____ (STATE, REGION, COUNTY, ZIP CODE)

YEAR/QUARTER / ACTIVITY/INDICATOR	1971					1972					19 . . .				74		1975				
	1	2	3	4	TOTAL	1	2	3	4	TOTAL	1	2	3		4	TOTAL	1	2	3	4	TOTAL
CONSTRUCTION (Continued)																					
Residential																					
Demolition Permits																					
Number of Housing Units																					
Building Permits																					
Number of Housing Units																					
Utility Hook-Ups																					
Non-Residential																					
Demolition Permits																					
Floor Space (sq. ft.)														. . .							
Manufacturing																					
Warehouse																					
Office																					
Retail																					
Building Permits																					
Floor Space (sq. ft.)																					
Manufacturing																					
Warehouse																					
Office																					
Retail																					
Utility Hook-Ups														. . .							

TABLE XVI (CONTINUED)
FLOOD IMPACT/RECOVERY MONITORING SUMMARY

AREA _____ (STATE, REGION, COUNTY, ZIP CODE)

YEAR/QUARTER / ACTIVITY/INDICATOR	1971					1972					19 . . .				74		1975				
	1	2	3	4	TOTAL	1	2	3	4	TOTAL	1	2	3		4	TOTAL	1	2	3	4	TOTAL
TRANSPORTATION																					
Number of Firms																					
Sales																					
Net Income																					
Wages and Salaries																					
Capital Expenditures																					
Employment																					
Witholding Taxes																					
Cost of Goods Sold														. . .							
COMMUNICATION																					
Number of Firms																					
Sales																					
Net Income																					
Wages and Salaries																					
Capital Expenditures																					
Employment																					
Witholding Taxes																					
Cost of Goods Sold																					
Number of Customers																					
														. . .							

TABLE XVI (CONTINUED)
FLOOD IMPACT/RECOVERY MONITORING SUMMARY

AREA _____ (STATE, REGION, COUNTY, ZIP CODE)

YEAR/QUARTER / ACTIVITY/INDICATOR	1971					1972					19 . . .			74		1975				
	1	2	3	4	TOTAL	1	2	3	4	TOTAL	1	2	3	4	TOTAL	1	2	3	4	TOTAL
ELECTRIC SERVICES																				
Number of Firms																				
Sales																				
Net Income																				
Wages and Salaries																				
Capital Expenditures																				
Employment																				
Witholding Taxes																				
Cost of Goods Sold																				
Number of Customers											. . .									
SANITARY SERVICES																				
Number of Firms																				
Sales																				
Net Income																				
Wages and Salaries																				
Capital Expenditures																				
Employment																				
Witholding Taxes																				
Cost of Goods Sold																				
Number of Customers																				
Number Not Meeting Water Quality Standards											. . .									

TABLE XVI (CONTINUED)
FLOOD IMPACT/RECOVERY MONITORING SUMMARY

AREA _____ (STATE, REGION, COUNTY, ZIP CODE)

YEAR/QUARTER / ACTIVITY/INDICATOR	1971					1972					19 . . .				74		1975				
	1	2	3	4	TOTAL	1	2	3	4	TOTAL	1	2	3		4	TOTAL	1	2	3	4	TOTAL
GAS SERVICES																					
Number of Firms																					
Sales																					
Net Income																					
Wages and Salaries																					
Capital Expenditures																					
Employment																					
Witholding Taxes																					
Cost of Goods Sold																					
Number of Customers														. . .							
WATER SERVICES																					
Number of Firms																					
Sales																					
Net Income																					
Wages and Salaries																					
Capital Expenditures																					
Employment																					
Witholding Taxes																					
Cost of Goods Sold																					
Number of Customers																					
Number not Meeting Water Quality Standards														. . .							

TABLE XVI (CONTINUED)
FLOOD IMPACT/RECOVERY MONITORING SUMMARY

AREA _____ (STATE, REGION, COUNTY, ZIP CODE)

ACTIVITY/INDICATOR \ YEAR/QUARTER	1971					1972					19 . . .			74		1975				
	1	2	3	4	TOTAL	1	2	3	4	TOTAL	1	2	3	4	TOTAL	1	2	3	4	TOTAL
STEAM HEAT SERVICE																				
Number of Firms																				
Sales																				
Net Income																				
Wages and Salaries																				
Capital Expenditures																				
Employment																				
Witholding Taxes																				
Costs of Goods Sold																				
Number of Customers																				
SERVICES																				
Sales																				
Net Income																				
Wages and Salaries																				
Capital Expenditures																				
Employment																				
Witholding Taxes																				

TABLE XVI (CONTINUED)
FLOOD IMPACT/RECOVERY MONITORING SUMMARY

AREA _____ (STATE, REGION, COUNTY, ZIP CODE)

YEAR/QUARTER / ACTIVITY/INDICATOR	1971					1972					19 . . . 74					1975				
	1	2	3	4	TOTAL	1	2	3	4	TOTAL	1	2	3	4	TOTAL	1	2	3	4	TOTAL
TRADE																				
Number of Firms																				
Sales																				
Net Income																				
Wages and Salaries																				
Capital Expenditures																				
Employment																				
Witholding Taxes																				
Costs of Goods Sold																				
Number Reporting Sales																				
Sales Reported																				
New Applications																				
Modified Applications																				
Number of Corporations Reporting Sales																				
FINANCIAL, INSURANCE AND REAL ESTATE																				
Number of Firms																				
Net Income																				
Wages and Salaries																				
Capital Expenditures																				
Employment																				
Witholding Taxes																				

TABLE XVI (CONTINUED)
FLOOD IMPACT/RECOVERY MONITORING SUMMARY

AREA _____ (STATE, REGION, COUNTY, ZIP CODE)

ACTIVITY/INDICATOR \ YEAR/QUARTER	1971					1972					19 . . .				74		1975				
	1	2	3	4	TOTAL	1	2	3	4	TOTAL	1	2	3		4	TOTAL	1	2	3	4	TOTAL
FINANCIAL, INSURANCE AND REAL ESTATE (Cont.)																					
Amount of Savings																					
Number of Accounts																					
Amount of Demand Deposits																					
Number of Accounts																					
Amount of Loans																					
Number of Loans																					
PRIVATE HOUSEHOLDS																					
Unemployment																					
Number Displaced																					
Number in Temporary Housing																					
Number Returned to Original Homes																					
Number Moving to Other Locations																					
Social/Economic Data from HUD Data Base																					

TABLE XVI (CONTINUED)
FLOOD IMPACT/RECOVERY MONITORING SUMMARY

AREA _____ (STATE, REGION, COUNTY, ZIP CODE)

YEAR/QUARTER / ACTIVITY/INDICATOR	1971					1972					19 . . . 74					1975				
	1	2	3	4	TOTAL	1	2	3	4	TOTAL	1	2	3	4	TOTAL	1	2	3	4	TOTAL
FEDERAL GOVERNMENT																				
Expenditures Proposed																				
Expenditures Approved																				
Actual Expenditures																				
Loans Outstanding																				
STATE GOVERNMENT																				
Expenditures Proposed																				
Expenditures Approved																				
Actual Expenditures																				
Loans Outstanding																				
LOCAL GOVERNMENT																				
Tax Base																				
Tax Revenues																				
Expenditures																				
CRIMINAL OFFENSES																				
Robbery																				
Aggrevated Assault																				
Burglary																				

TABLE XVI (CONTINUED)
FLOOD IMPACT/RECOVERY MONITORING SUMMARY

AREA _____ (STATE, REGION, COUNTY, ZIP CODE)

YEAR/QUARTER / ACTIVITY/INDICATOR	1971					1972					19 . . . 74					1975				
	1	2	3	4	TOTAL	1	2	3	4	TOTAL	1	2	3	4	TOTAL	1	2	3	4	TOTAL
HEALTH																				
Short Term Hospital Beds Available																				
Long Term Hospital Beds Available																				
Cases Eligible for Medical Assistance																				
Cases Certified Eligible for Medical Assistance																				
Cases Receiving Medical Assistance																				
State Mental Institutions (Cases over 65)																				
State Hospital Average Population																				
Persons Receiving Life Support Services																				
Polluted Surface Waters (Miles)																				
Polluted Ground Waters (Sq. Mi.)																				
Unsatisfactory Solid Waste Disposal Sites																				
INTELLECTUAL DEVELOPMENT																				
Children Eligible for Pre-School Education																				
Pre-School Enrollment																				
Pupils Eligible for Educational Program Services																				
Elementary and Secondary Educational Program Enrollment																				

TABLE XVI (CONTINUED)
FLOOD IMPACT/RECOVERY MONITORING SUMMARY

AREA _____ (STATE, REGION, COUNTY, ZIP CODE)

YEAR/QUARTER / ACTIVITY/INDICATOR	1971					1972					19 . . .			74		1975				
	1	2	3	4	TOTAL	1	2	3	4	TOTAL	1	2	3	4	TOTAL	1	2	3	4	TOTAL
SOCIAL DEVELOPMENT																				
Population Under 18																				
Number Receiving Welfare Services																				
Families Needing Homemaker Services																				
Families Receiving Homemaker Services																				
ECONOMIC DEVELOPMENT																				
Advertisement Responses																				
Industrial Projects																				
PIDA Projects																				
Community Facility Projects																				
Site Development Projects																				
New Employment Opportunities																				
PIDA Financed Employment Opportunities																				
Number Receiving Cash Grants																				
Number Below Poverty Level																				
Number Leaving Assistance Rolls																				
Number on Unemployment Compensation																				
Number in Instructional Courses																				
Number Completing Courses																				
Number Placed in Jobs																				
Percent of Unemployed Placed in Jobs																				

TABLE XVI (CONCLUDED)
FLOOD IMPACT/RECOVERY MONITORING SUMMARY

AREA _____ (STATE, REGION, COUNTY, ZIP CODE)

YEAR/QUARTER / ACTIVITY/INDICATOR	1971					1972					19			. . .	74		1975				
	1	2	3	4	TOTAL	1	2	3	4	TOTAL	1	2	3		4	TOTAL	1	2	3	4	TOTAL
ECONOMIC DEVELOPMENT (Cont.)																					
Substandard Dwelling Units																					
Families in Substandard Units																					
New Dwelling Units Due to State Efforts																					
Rehabilitates Units Due to State Efforts																					
Dwelling Units Raised to Code Standards																					
Federal Projects Receiving State Aid																					
Local Projects Receiving State Aid																					
Damage Caused by Soil Erosion														. . .							

first quarter of 1971 and runs to the termination of the monitoring effort.

Since FIRMS is a generalized data form, the "quarterly" and "total" columns do not apply uniformly in all cases. For example, the total number of farms is not the sum of the number of farms for each quarter; however, the total farm income is the sum of the quarterly farm income. For some indicators, data are only available annually; for others, the quarterly data may only be an estimate, whereas the annual data is calculated. In these latter two cases the "total" column should be used, but not the "quarterly" columns.

Data Input. The FIRMS record will be updated on a quarterly basis and will also be aggregated on a yearly basis. Data may be entered at several levels. The data may be entered at the ZIP code, county, region, or state level of aggregation. Here too, the availability of the data at each level, as well as the amount of data involved, will help to determine the level of aggregation. To be most useful, the data in FIRMS and the data in DRES should be aggregated at the same level so that meaningful comparisons can be made.

Table XVII indicates the amount of data to be entered at each update and for the entire year.

Use. The FIRMS record can be used to evaluate the effect of the flood on growth and to evaluate the effectiveness of the flood recovery efforts. The data in the file will provide a description of the growth or contraction of the 23 activities being measured.

By comparing pre-flood growth (contraction) with the growth (contraction) in the quarters immediately following the flood, it will be possible to evaluate the impact of the flood on growth.

TABLE XVII
AMOUNT OF DATA INPUT INTO FIRMS

SOURCE LEVEL	QUARTERLY DATA ENTRIES	YEARLY DATA ENTRIES
ZIP Code	205,000	1,025,000
County	13,735	68,675
Region	2,050	10,250
State	205	1,025

For later quarters, after the flood recovery programs have started to take effect, the growth (contraction) will include both normal growth (contraction) and growth or recovery due to the flood recovery efforts. By comparing developments with pre-flood conditions and using DRES to assess the flood recovery expenditures, it will be possible to separate recovery from normal growth and to monitor effectiveness of the flood recovery programs.

Computerized Data Base

An automated or computerized data base is capable of processing considerably larger and more detailed amounts of data than a manual data base. For the Flood Damage/Recovery Data Base, the amount of data processed is not as important as the ability to use the data for flood recovery planning and monitoring. As a result, the data base should be viewed in the broader context of providing a data management system rather than just providing a means of storing and retrieving data to produce reports in a specified format.

System Processing Requirements

There are subtle, but important, differences between the operational capabilities of a data management system and a data processing system.

Data processing systems utilize the power of a computer primarily to maintain records of various activities. Transactions (changes or additions to the data) are usually in one format and are made according to precise, rigid procedures. The procedures usually follow well-documented policy or legal requirements. Efficiency results from maintaining accurate data reeords by the automation of the repetitive procedures. There is very little need for flexibility in the system, since procedures usually change only when legal or policy changes occur.

In contrast, decision making requires the capability to identify and quantify relationships among the data and to summarize the information contained in the data. Requests for information frequently occur in a manner which requires changes to the report format or content. Consequently, explicit procedures to update files are not as important as the capability to manipulate data, e.g., to produce reports, to make extrapolations from the data, to organize data according to specific attributes, to identify relationships or inconsistencies in the data, etc.

To be responsive, the Flood Damage/Recovery Data Base must be capable of meeting these decision making requirements. In addition it requires a data processing capability which exceeds normal management information system capabilities. This requirement arises from the need to process large amounts of data obtained from many diverse sources whose formats are not under the control of the Flood Damage/Recovery Data Base system.

Furthermore, the capability for interaction with the data base must be provided. Requests for information will often be based upon the knowledge obtained from reports previously generated by the system. Thus, the data base system must be capable of generating a variety of reports and of modifying or adding reports to satisfy current needs. This must be possible with only a minimal amount of change to the software. This requires that the data base be structured so that it is independent of the reporting system.

For these reasons the data base requires the capabilities summarized in Table XVIII. These capabilities are the salient features of most data management systems. It is beyond the scope of this paper to discuss the operational aspects of these capabilities.

The remainder of this section describes a demonstration of the development of the Flood Damage/Recovery Data Base in the context of a specific data management system. The power and flexibility of the data management system for report generation is then illustrated.

TABLE XVIII
SYSTEM PROCESSING REQUIREMENTS

REQUIREMENT	CAPABILITY
Data Record and File Flexibility	The system responds quickly to requests for change based on management analysis of information in the system and changes in the activities being reported. Data records and file organization become responsive to directed change. Since impact on existing software is minimal, the design and programming phases may have much more overlap.
Multiple Transaction Formats, Transaction Editing, and Transaction Reporting Capability	Data provided from multiple sources are applied in the same update run. Data base quality is enhanced by easily invoked edit tests, transaction anomaly and transaction summary reports.
Catalog of Standard Reports	Production of Periodic Reports becomes a clerical task. Single Card Calls eliminate errors. Reports are readily added or deleted to existing runs.
System Debug Facilities	Minimal Response time to management information requests. Reduced System Implementation Time. Integration of Ad Hoc Requests into existing runs.
System Report Capability	Rapid conversion of data into information, such as averages, ranks, totals, etc. Timely response (24-48 hours) to management request for information from the system.
Multiple File Coordination Capability	Information on relationships among diverse data types related by some key identifier are easily prepared.

Demonstration of a Flood Damage/Recovery Information System

A two man-week effort was undertaken to structure the Flood Damage/Recovery Data Base for use with an existing data management system (DMS) and to modify the DMS to meet the requirements of the Flood Damage/Recovery Information System. Due to the short time available for this effort, some liberties were taken with the requirements and specifications presented in this paper. However, the selected system does have the capability of easily accepting most of the required system changes, not all of which are described in this paper (all changes discussed in this paper are easily accepted).

Only the data base structure and the report generating capability will be discussed. The actual demonstration also shows the multiple file coordination capability and the multiple transaction definition capability of the system; however, a discussion of these latter capabilities is beyond the scope of this paper.

It should be noted that the total computer cost associated with the testing and specification for this demonstration were under $75 at commercial rates.

Data Management System. The MARK IV system has been used in our demonstration because of its availability to MITRE personnel and their knowledge of its operations and capabilities. This system has been employed successfully by MITRE on other efforts. It is not our intention to suggest that the MARK IV system is better or less expensive than others available; rather, our familiarity with this system allowed the demonstration to be accomplished in minimum time and at minimum expense to this effort. A choice among competing file management systems should be based on an analysis of systems capabilities. The viability of the system should also be considered.

Data Base Structure. The Flood Damage/Recovery Data Base for use with the MARK IV file system has initially been developed as a four file system. Table XIX presents an overview of the data base.

The four files in the data base contain information on Flood Damage, Recovery Expenditures, Economic Activity, and Government Activity. The latter two files are used to maintain the Flood Impact/ Recovery Monitoring section of the data base.

The data is organized into files which may be maintained and accessed with a reasonable level of effort based upon our assessment of the sources and use of the actual data. The file design permits any program to easily access and report from all files concurrently, if so required. All facets of the design, such as file organization, file sequence, record structure, etc., are independent of any report sequence.

It would be possible to organize the data into fewer files, however, this would require a more complex record structure and would increase the difficulty of examining relationships among segments of a record.

Record Keys. Files in the data base are in sequence by record keys which are used to identify the data in each file. The first three record keys are location identifiers and are the same in each file.

The FIPS (Federal Information Processing Standards) code is a numeric code corresponding to the alphabetic arrangement of the county name. The second key contains the community name or other location identification. The third key contains the ZIP code. (Since all ZIP codes in Pennsylvania begin with "1", only the last four digits are used.)

TABLE XIX
PENNSYLVANIA FLOOD DAMAGE/RECOVERY DATA BASE OVERVIEW

File Name	FLOOD DAMAGES	RECOVERY EXPENDITURE	ECONOMIC[1] ACTIVITY	GOVERNMENT[1] ACTIVITY
Record Keys (in sequence)	FIPS Code LOCATION ZIP Code SIC Code	FIPS Code LOCATION ZIP Code PROJECT Code	FIPS Code LOCATION ZIP Code SIC Code	FIPS Code LOCATION ZIP Code SIC Code Project Code Project Status
Record Characteristics	Single Level	Hierarchial Repeating Segments Identified by Year and Quarter	Hierarchial Multiple Repeating Segments usually Identified by Activity and Time	Hierarchial Repeating Segments Identified by Year and Quarter
	Fixed Length	Variable Length	Variable Length	Variable Length
Record Contents	Flood Damage Statistics in Dollars and Units by Category.	Recovery Funds by source, and timing	Levels of Economic Activity such as sales, employment, etc.	Government and Social Indicators such as crime statistics, tax base, unemployment, etc.

1. Used to maintain the Flood Impact/Recovery Monitoring Section. Data from these two files (or from all four files) may easily be included on the same page of any computer generated report.

The system can be designed to assign pseudo codes when actual data is unavailable for any of these three keys. Also functions can be defined to generate partial zip codes from the location code. The decision to develop and execute an algorithm to assign these codes will depend on both the significance of reporting data to this level of detail and the complexity of the algorithm. The file management system permits these variations by its power in permitting the sorting and summarizing of report data.

Two other keys have been developed for specific files. The Standard Industrial Classification code is used as a key for both the Flood Damages and the Economic Activity files. A Project Code is used in the Recovery Expenditure file to relate flood recovery funding by project to the source of funding.

Record Characteristics. The characteristics of the record structure for each file are summarized in Table XIX. The most complex record structure is contained in the Economic Activity file. The record structure for this file will be illustrated using Figure 24.

This file contains diverse types of data which are industry dependent. The record structure, a hierarchical structure, provides for all types of such data. The first level of data in each record contains the record keys and other descriptive data which are neither time nor industry dependent.

The second level organizes the Economic Activity data by activity and time, with a variable number of occurrences allowed. With the exception of farming data, the economic data are maintained by year and quarter in the record.

The third level illustrates a possible lower activity level using farming as an example. This level allows farming activity to be separated into categories such as crops and livestock.

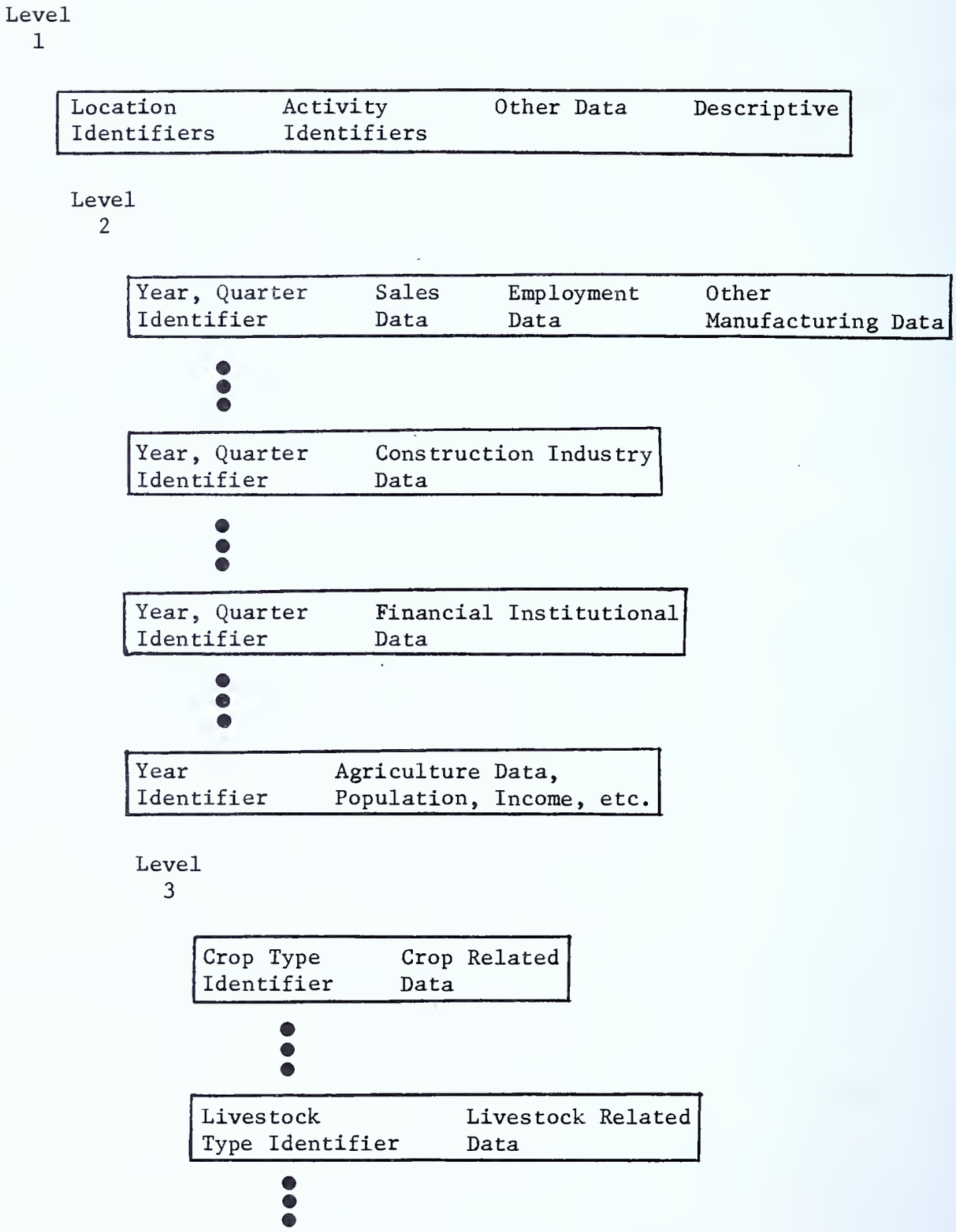


FIGURE 24
ECONOMIC ACTIVITY FILE RECORD CONCEPT

The Flood Damage file does not have a hierarchal level because the flood damage data represents one flood. This damage data will not change with time.

Record Content. The data elements contained in each record are those which have previously been discussed in Section IV, Data Base Design. The Flood Damage file contains the damage data. The Recovery Expenditure file contains the recovery expenditure data. The Economic Activity and Government Activity files contain the flood impact/recovery monitoring data.

A complete preliminary description of all file records has been accomplished and is maintained in a system library. These descriptions are generated and used by the file management system at the request of any user. Some changes are certainly unavoidable prior to any system implementation. All file record descriptions contain special fields which will facilitate any such change.

Report Capability. Twelve different reports have been defined for the Flood Damage/Recovery Data Base, using the MARK IV system. After correcting all format errors, the reports were catalogued in the system so that future requests may be executed by a single card call.

Two of these reports, Major Crime Summary and Annual Crime Report, have been processed against test data. These reports will be used to illustrate the report development capability and the automatic data summary capability of the system. Also, the capability of the system to generate sample report formats will be shown using the above two reports.

Figures 25 and 26 present the two reports. The Major Crime Summary presents the number of crimes in three categories and the percentage change from the previous year for a number of cities. The Annual Crime Report presents the same data in a different format and also sums the crime data for each year. Actual 1971 data is shown; however, 1972 and 1973 data are hypothetical and have been used for illustration.

MAJOR CRIME SUMMARY
CRIME STATISTICS BY LOCATION

FIPS CODE	LOCATION	ZIP CODE	YR	NUMBER OF ROBBERIES	PCT CHG	NUMBER AGG ASSAULT	PCT CHG	NUMBER OF BURGLARIES	PCT CHG
2	PITTSBURGH	5200	71	2,556		1,910		9,489	
			72	2,540	-1	1,902	-1	9,486	-1
			73	2,306	-10	1,904		9,608	1
7	ALTOONA	6601	71	22		33		702	
			72	38	72	30	-10	610	-14
			73	51	34	36	20	983	61
22	HARRISBURG	7101	71	308		304		1,000	
			72	260	-16	300	-2	891	-11
			73	350	34	350	16	1,325	48
25	ERIE	6500	71	273		141		1,400	
			72	276	1	150	6	1,421	1
			73	270	-3	156	4	1,417	-1
40	WILKES-BARRE	8700	71	19		2		246	
			72	15	-22	2		208	-16
			73	52	246	6	200	316	51
48	BETHLEHEM	8015	71	59		99		544	
			72	49	-17	95	-5	494	-10
			73	79	61	102	7	686	38
51	PHILADELPHIA	9100	71	9,243		4,970		20,914	
			72	9,210	-1	4,980		21,011	
			73	9,022	-3	5,000		21,570	2

FIGURE 25
SAMPLE MAJOR CRIME REPORT

ANNUAL CRIME REPORT

	YR	LOCATION	NUMBER OF ROBBERIES	PCT CHG	NUMBER AGG ASSAULT	PCT CHG	NUMBER OF BURGLARIES	PCT CHG
	71	ALTOONA	22		33		702	
		BETHLEHEM	59		99		544	
		ERIE	273		141		1,400	
		HARRISBURG	308		304		1,000	
		PHILADELPHIA	9,243		4,970		20,914	
		PITTSBURGH	2,556		1,910		9,489	
		WILKES-BARRE	19		2		246	
YR TOTAL	71		12,480		7,459		34,295	
	72	ALTOONA	38	72	30	-10	610	-14
		BETHLEHEM	49	-17	95	-5	494	-10
		ERIE	276	1	150	6	1,421	1
		HARRISBURG	260	-16	300	-2	891	-11
		PHILADELPHIA	9,210	-1	4,980		21,011	
		PITTSBURGH	2,540	-1	1,902	-1	9,486	-1
		WILKES-BARRE	15	-22	2		208	-16
YR TOTAL	72		12,388		7,459		34,121	
	73	ALTOONA	51	34	36	20	983	61
		BETHLEHEM	79	61	102	7	686	38
		ERIE	270	-3	156	4	1,417	-1
		HARRISBURG	350	34	350	16	1,325	48
		PHILADELPHIA	9,022	-3	5,000		21,570	2
		PITTSBURGH	2,300	-10	1,904		9,608	1
		WILKES-BARRE	52	246	6	200	316	51
YR TOTAL	73		12,124		7,554		35,905	

FIGURE 26
SAMPLE ANNUAL CRIME REPORT

These reports were generated by one program and required only a minimal effort. The program contains 70 statements, of which only 22 were required to specify the report formats, sequence, and editing rules. The rest of the statement are used to update the master file with the current year's data, to calculate the percentage changes, and to generate the reports.

Report Definition. Figure 27 shows the statements which are used to specify the report format, sequence, and editing rules for the Major Crime Summary. This figure will be used to show the ease with which the report can be developed.

The discussion which follows pertains to the columns indicated by the letters across the top of Figure 27.

Column A, sequence number, describes the sequence in which the report field names, Column C, are to appear on the page; first, the FIPS code, then the location, etc. (see Figure 25). These cards may be in any order in the program; they do not have to appear in the order they are to be printed.

Column B, SP BF COL, defines the spacing between fields. Location starts one space after FIPS (see Figure 25).

Column D, SEQ, defines on what keys the data are to be sorted and in what order. In this example, the data are to be sorted by FIPS, then by location, then by ZIP, and then by year. Since the FIPS and ZIP are identical for each location in the example in Figure 25 only the yearly sort appears (see next comment).

Column E, CTL, is used to suppress the printing of redundant information in the same fields for multiple report records. Such a field will not print again on a specific page unless the contents of this field or the contents of a field with a higher sequence number changes.

```
      A   B        C            D     E     F
 ------------------------------------------------------------------------------------------------------------------
                SP  Q                E  N  S  D  C  S  T  C  C  M  M  A  Q  PCT/        P                    PARTIAL
CARD SEQ        BF  L  FIELD         N  P  E  E  T  U  O  U  N  A  I  V  L  RATIO   RA- C      PICTURE     STRT NO      SEQUENCE
TYPE NO.        COL F  NAME          D  R  Q  S  L  B  T  M  T  X  N  G  F  FIELD   TIO T       EDIT       CHR CHR      73 TO 80
 ------------------------------------------------------------------------------------------------------------------
(R3)( 1 )( 0)  (FIPS     )          (1)   (1)
(R3)( 2 )( 1)  (LOCAT(ON)           (2)   (2)
(R3)( 3 )( 1)  (ZIP      )          (3)   (3)
(R3)( 4 )      (YR       )          (4)   I4)
(R3)( 7 )      (NUM ROB )
(R3)( 8 )( 1)(T,ROB PER )
(R3)( 9 )      (NUM ASUL)
(R3)(10 )( 1)(T,ASULPER )
(R3)(11 )      (NUM BURG)
(R3)(12 )( 1)(T,BURGPER )
 ------------------------------------------------------------------------------------------------------------------
CARD  SEQ                                                                                                  SEQUENCE
TYPE  NO.                                                TEXT                                              73 TO 80
 ------------------------------------------------------------------------------------------------------------------
(T3) ( 1 )                 (MAJOR CRIME SUMMARY@                                          )
(T3) ( 2 )                 (CRIME STATISTICS BY LOCATION@                                 )
```

FIGURE 27
MAJOR CRIME SUMMARY REPORT SPECIFICATION

Column F, TOT, is used to generate summary statistics. For example, if a 2 were entered in this position for field NUM ROB, the total number of robberies in a community would automatically be generated on a summary report line for each location. Other statistics may be similarly generated.

Sample Report Generation. An additional feature of the MARK IV system is the capability to develop sample reports so that report format and the program for generating the report can be checked without actually using test data.

The Major Crime Summary and Annual Crime Report will be used to demonstrate this capability. The sample reports appear in Figure 28. Since data are not specified, the report format is presented. Use x's for characters and 1's for numerical data. The sample report contains only one sample of each type of data row.

The report format, as well as the complete program may be checked without any test data and, if satisfactory, stored in the system library. All calls for these reports may be executed by a single card request. In addition, all such programs are independent modules and any number of modules may be combined in any run.

The reports presented in this section are only examples. Their purpose has been to demonstrate the rapid response capability to any managerial requests for information by a computerized system. These types of reports would be expected to be ready on the same day that management first requested the information.

If a file management system such as MARK IV were to be employed, it is necessary, of course, to train some personnel in its capabilities and use. The education requirements for these personnel need not exceed a high school diploma and the training time is generally minimal.

ANNUAL CRIME REPORT

	YR	LOCATION	NUMBER OF ROBBERIES	PCT CHG	NUMBER AGG ASSAULT	PCT CHG	NUMBER OF BURGLARIES	PCT CHG
	XX	XXXXXXXXXXXXXXX	1	1	1	1	1	1
YR TOTAL	XX		1		1		1	

MAR 13, 1973

MAJOR CRIME SUMMARY
CRIME STATISTICS BY LOCATION

PAGE 1

FIPS CODE	LOCATION	ZIP CODE	YR	NUMBER OF ROBBERIES	PCT CHG	NUMBER AGG ASSAULT	PCT CHG	NUMBER OF BURGLARIES	PCT CHG
1	XXXXXXXXXXXXXXX	XXXX	XX	1	1	1	1	1	1

FIGURE 28
SAMPLE REPORT GENERATION

DATA SOURCES

During the course of the study, 33 potential data sources were identified and contacted. The data base of each source was reviewed and its applicability to the Flood Damage/Recovery Data Base identified. A detailed discussion of each data source is presented in Appendix F.

For each class of data, sources which maintain data bases were identified; if more than one source was available, each source was evaluated to determine its relative value. Four factors were used for evaluating the multiple data sources.

The first factor was the timeliness of the data. Timeliness consists of two parts:

(a) how often the data are collected, i.e., quarterly, monthly, annually; and

(b) how much time elapses between collection and the time when the data would be available for entry into the Flood Damage/Recovery Data Base.

The second factor considered in evaluating the data sources was the methodology used in developing the data. This becomes an important factor when one attempts to evaluate the data in terms of accuracy. For example, data obtained from the Department of Revenue through its tax records is of a higher quality than data developed via estimates provided through a non-fiscal collection system. Cost, the third factor considered in the evaluation, is also of prime importance. This element of the evaluation was reflected in the evaluation in terms of whether the data were in a computerized or manual form. The computerized form, of course, is less expensive to assemble at a given level of detail than the manual form. The final factor considered in the evaluation was the level of detail available in the data.

It was not possible within the scope of this study to perform a rigorous evaluation of the data sources; however, based upon the four

factors discussed in the preceding paragraph, a rough ranking scheme was developed and used in the evaluation of multiple data sources for a specific data element. Each source was classified as one of the following:

(a) P = primary

(b) S = secondary

(c) SP = secondary, but only contains a portion of the data for a data element

(d) SD = secondary detail, indicates the data source has more detail than the primary, but because of the methodology, cost or timeliness, the data source could not be classified as primary.

In general, a data source was classified as primary if it met either one or both of the following criteria:

(a) data base was automated

(b) methodology used in collecting data indicated that data would be of a higher quality and be more accurate than the other sources.

If the source was not classified as primary, it was classified according to the appropriate secondary category.

A summary of the findings is presented in the matrix given in Table XX. The vertical axis represents the various classes of data in the proposed Flood Damage/Recovery Data Base; the horizontal axis represents the various data sources.

PROBLEMS AND LIMITATIONS

This study was conducted based on the assumption that the Flood Damage/Recovery Data Base would be developed primarily from existing data sources. Since no integrated data collection system was in existence at the time of the flood, the Flood Damage/Recovery Data Base must be based upon a collection of diverse uncorrelated sets of data. This has resulted in several problems which were identified during the course of this study. These problems are discussed in the following paragraphs.

TABLE XX
DATA SOURCES MATRIX

DATA ELEMENT	FEDERAL AGENCIES														STATE AGENCIES																	OTHER		
	EMERGENCY PREPAREDNESS	CORPS OF ENGINEERS	HOUSING & URBAN DEVELOPMENT	LABOR	GENERAL SERVICES ADMIN.	SMALL BUSINESS ADMIN.	TRANSPORTATION	AGRICULTURE	COMMERCE	HEALTH EDUCATION, & WELFARE	EXECUTIVE OFFICE	AGRICULTURE	BANKING	CIVIL DEFENSE	COMMERCE	COMMUNITY AFFAIRS	EDUCATION	ENVIRONMENTAL RESOURCES	JUSTICE	LABOR & INDUSTRY	MILITARY AFFAIRS	PUBLIC WELFARE	REVENUE	TRANSPORTATION	PUBLIC UTILITIES	HIGHER EDUCATION ASSISTANCE	LOCAL GOVERNMENT	POSTAL SERVICE	RED CROSS	MATHEMATICA	DUN & BRADSTREET	UTILITIES	OTHER
DIRECT DAMAGE/EXPENDITURES																																		
REAL PROPERTY																																		
Private																																		
Agriculture						SP		P				S																						
Mining														S								P								S				
Construction														S								P								S				
Manufacturing														S								P								S				
Transportation														S								P		S						S				
Communications														S								P		S						S				
Electric Services														S								P		S						S				
Gas Services														S								P		S						S				
Sanitary Services														S								P		S						S				
Water Services														S								P		S						S				
Steam Heat Services														S								P		S						S				

CODE: P - primary
S - secondary
SD - secondary; greater detail than primary
SP - secondary; only covers part of category

TABLE XX (CONTINUED)
DATA SOURCES MATRIX

DATA ELEMENT	FEDERAL AGENCIES															STATE AGENCIES																	OTHER		
	EMERGENCY PREPAREDNESS	CORPS OF ENGINEERS	HOUSING & URBAN DEVELOPMENT	LABOR	GENERAL SERVICES ADMIN	SMALL BUSINESS ADMIN	TRANSPORTATION	AGRICULTURE	COMMERCE	HEALTH EDUCATION, & WELFARE	EXECUTIVE OFFICE	AGRICULTURE	BANKING	CIVIL DEFENSE	COMMERCE	COMMUNITY AFFAIRS	EDUCATION	ENVIRONMENTAL RESOURCES	JUSTICE	LABOR & INDUSTRY	MILITARY AFFAIRS	PUBLIC WELFARE	REVENUE	TRANSPORTATION	PUBLIC UTILITIES	HIGHER EDUCATION ASSISTANCE	LOCAL GOVERNMENT	POSTAL SERVICE	RED CROSS	MATHEMATICA	DUN & BRADSTREET	UTILITIES	OTHER
DIRECT DAMAGE/EXPENDITURES (Cont'd)																																			
REAL PROPERTY																																			
Private																																			
Trade														S								P								S				
Financial, Insurance, Real Estate														S								P								S				
Services	S													S		P					P	P								S				
Private Households						P																				S		S						
Public																																			
Streets and Roads	P						P				S			SD										SD										
Dikes and Levees	P	SD									S			SD																				
Public Buildings	P									SP	S			SD			SP					SP												
Public Utilities	P										S			SD																				
Facilities Under Construction	P										S			SD																				
Other																	SP																	

CODE: P - primary
S - secondary
SD - secondary; greater detail than primary
SP - secondary; only covers part of category

TABLE XX (CONTINUED)
DATA SOURCES MATRIX

| DATA ELEMENT | FEDERAL AGENCIES | | | | | | | | | | | | | | | | | | STATE AGENCIES | | | | | | | | | | | | | | | | | |

TABLE XX (CONTINUED)
DATA SOURCES MATRIX

DATA ELEMENT	FEDERAL AGENCIES														STATE AGENCIES															OTHER				
	EMERGENCY PREPAREDNESS	CORPS OF ENGINEERS	HOUSING & URBAN DEVELOPMENT	LABOR	GENERAL SERVICES ADMIN.	SMALL BUSINESS ADMIN.	TRANSPORTATION	AGRICULTURE	COMMERCE	HEALTH EDUCATION & WELFARE	EXECUTIVE OFFICE	AGRICULTURE	BANKING	CIVIL DEFENSE	COMMERCE	COMMUNITY AFFAIRS	EDUCATION	ENVIRONMENTAL RESOURCES	JUSTICE	LABOR & INDUSTRY	MILITARY AFFAIRS	PUBLIC WELFARE	REVENUE	TRANSPORTATION	PUBLIC UTILITIES	HIGHER EDUCATION ASSISTANCE	LOCAL GOVERNMENT	POSTAL SERVICE	RED CROSS	MATHEMATICA	DUN & BRADSTREET	UTILITIES	OTHER
BUSINESS ACTIVITY																																		
CORPORATIONS AND BUSINESS																																		
Gross Sales																						P												
Net Income																						P												
Wages and Salaries																				P		S												
Employment																						P												
Cost of Goods Sold																						P												
Captial Expenditures														P																				
Witholding Taxes																						P												
SALES TAX																																		
Number Reporting																						P												
New Applications																						P												
Modified Applications																						P												
Number Corporations Reporting																						P												
Gross Sales Reported																						P												
UTILITIES																																		
Number of Customers																										P					P			
Number Not Meeting Water Quality Standards																	P									S					S			

CODE: P - primary
S - secondary
SD - secondary; greater detail than primary
SP - secondary; only covers part of category

TABLE XX (CONTINUED)
DATA SOURCES MATRIX

| DATA ELEMENT | FEDERAL AGENCIES | | | | | | | | | | | | | | | | | | | | | STATE AGENCIES | | | | | | | | | | | | | | | | | | |

TABLE XX (CONTINUED)
DATA SOURCES MATRIX

DATA ELEMENT	FEDERAL AGENCIES															STATE AGENCIES																		OTHER		
	EMERGENCY PREPAREDNESS	CORPS OF ENGINEERS	HOUSING & URBAN DEVELOPMENT	LABOR	GENERAL SERVICES ADMIN.	SMALL BUSINESS ADMIN.	TRANSPORTATION	AGRICULTURE	COMMERCE	HEALTH EDUCATION, & WELFARE	EXECUTIVE OFFICE	AGRICULTURE	BANKING	CIVIL DEFENSE	COMMERCE	COMMUNITY AFFAIRS	EDUCATION	ENVIRONMENTAL RESOURCES	JUSTICE	LABOR & INDUSTRY	MILITARY AFFAIRS	PUBLIC WELFARE	REVENUE	TRANSPORTATION	PUBLIC UTILITIES	HIGHER EDUCATION ASSISTANCE	LOCAL GOVERNMENT	POSTAL SERVICE	RED CROSS	MATHEMATICA	DUN & BRADSTREET	UTILITIES	OTHER
FEDERAL GOVERNMENT																																				
Expenditures Approved	S	S	S	S		S	S	S	S	S	P																									
Actual Expenditures	S	S	S	S		S	S	S	S	S	P																									
Loans Outstanding						P		P																												
STATE GOVERNMENT																																				
Expenditures Approved											P																									
Actual Expenditures											P																									
Loans Outstanding											P				S																					
LOCAL GOVERNMENT																																				
Tax Base																										P										
Tax Revenues																										P										
Expenditures																										P										

TABLE XX (CONTINUED)
DATA SOURCES MATRIX

DATA ELEMENT	FEDERAL AGENCIES														STATE AGENCIES													OTHER						
	EMERGENCY PREPAREDNESS	CORPS OF ENGINEERS	HOUSING & URBAN DEVELOPMENT	LABOR	GENERAL SERVICES ADMIN.	SMALL BUSINESS ADMIN.	TRANSPORTATION	AGRICULTURE	COMMERCE	HEALTH EDUCATION, & WELFARE	EXECUTIVE OFFICE	AGRICULTURE	BANKING	CIVIL DEFENSE	COMMERCE	COMMUNITY AFFAIRS	EDUCATION	ENVIRONMENTAL RESOURCES	JUSTICE	LABOR & INDUSTRY	MILITARY AFFAIRS	PUBLIC WELFARE	REVENUE	TRANSPORTATION	PUBLIC UTILITIES	HIGHER EDUCATION ASSISTANCE	LOCAL GOVERNMENT	POSTAL SERVICE	RED CROSS	MATHEMATICA	DUN & BRADSTREET	UTILITIES	OTHER
AGRICULTURE																																		
Number of Farms								S			P																						
Livestock Value								S			P																						
Crop Value								S			P																						
Dairy Production								S			P																						
Total Income								S			P																						
Average Income								S			P																						
Farm Population								S			P																						
Employment								S			P																						
PRIVATE HOUSEHOLDS																																		
Unemployment																			P														
Number Displaced									S																		P						
Number in Temporary Housing									P																		S						
Number Returned to Original Homes																											P						
Number Moving to Other Area																											P						
Social/Economic Data from HUD			P																														

CODE: P - primary
S - secondary
SD - secondary; greater detail than primary
SP - secondary; only covers part of category

TABLE XX (CONTINUED)
DATA SOURCES MATRIX

| DATA ELEMENT | FEDERAL AGENCIES | | | | | | | | | | | | STATE AGENCIES | | | | | | | | | | | |

TABLE XX (CONTINUED)
DATA SOURCES MATRIX

DATA ELEMENT	FEDERAL AGENCIES										STATE AGENCIES																	OTHER						
	EMERGENCY PREPAREDNESS	CORPS OF ENGINEERS	HOUSING & URBAN DEVELOPMENT	LABOR	GENERAL SERVICES ADMIN	SMALL BUSINESS ADMIN.	TRANSPORTATION	AGRICULTURE	COMMERCE	HEALTH EDUCATION & WELFARE	EXECUTIVE OFFICE	AGRICULTURE	BANKING	CIVIL DEFENSE	COMMERCE	COMMUNITY AFFAIRS	EDUCATION	ENVIRONMENTAL RESOURCES	JUSTICE	LABOR & INDUSTRY	MILITARY AFFAIRS	PUBLIC WELFARE	REVENUE	TRANSPORTATION	PUBLIC UTILITIES	HIGHER EDUCATION ASSISTANCE	LOCAL GOVERNMENT	POSTAL SERVICE	RED CROSS	MATHEMATICA	DUN & BRADSTREET	UTILITIES	OTHER
INTELLECTUAL DEVELOPMENT																																		
Children Eligible for Pre-School Education																	P																	
Pre-School Enrollment																	P																	
Pupils Eligible for Educational Program Services																	P																	
Elementary and Secondary Educational Program Enrollment																	P																	
SOCIAL DEVELOPMENT																																		
Population Under 18											P																							
Number Receiving Welfare Services																					P													
Families Needing Homemaker Services																					P													
Families Receiving Homemaker Services																					P													
ECONOMIC DEVELOPMENT																																		
Advertisement Responses															P																			
Industrial Projects															P																			
PIDA Projects															P																			
Community Facility Projects															P																			

CODE: P - primary
S - secondary
SD - secondary; greater detail than primary
SP - secondary; only covers part of category

TABLE XX (CONTINUED)
DATA SOURCES MATRIX

DATA ELEMENT	FEDERAL AGENCIES											STATE AGENCIES																					OTHER		
	EMERGENCY PREPAREDNESS	CORPS OF ENGINEERS	HOUSING & URBAN DEVELOPMENT	LABOR	GENERAL SERVICES ADMIN.	SMALL BUSINESS ADMIN.	TRANSPORTATION	AGRICULTURE	COMMERCE	HEALTH EDUCATION, & WELFARE	EXECUTIVE OFFICE	AGRICULTURE	BANKING	CIVIL DEFENSE	COMMERCE	COMMUNITY AFFAIRS	EDUCATION	ENVIRONMENTAL RESOURCES	JUSTICE	LABOR & INDUSTRY	MILITARY AFFAIRS	PUBLIC WELFARE	REVENUE	TRANSPORTATION	PUBLIC UTILITIES	HIGHER EDUCATION ASSISTANCE	LOCAL GOVERNMENT	POSTAL SERVICE	RED CROSS	MATHEMATICA	DUN & BRADSTREET	UTILITIES	OTHER
ECONOMIC DEVELOPMENT (Cont'd)																																			
Site Development Projects															P																				
New Employment Opportunities															P																				
PIDA Financed Employment Opportunities															P																				
Number Receiving Cash Grants																					P														
Number Below Poverty Level																					P														
Number Leaving Assistance Rolls																					P														
Number on Unemployment Compensation																				P															
Number in Instructional Courses																S	S			P															
Number Completing Courses																S	S			P															
Number Placed in Jobs																S	S			P															
Percent of Unemployed Placed in Jobs											P																								
Substandard Dwelling Units																P																			
Families in Substandard Units																P																			

CODE: P - primary
S - secondsry
SD - secondsry; greater detsil than primary
SP - secondary; only covers part of category

TABLE XX (CONCLUDED)
DATA SOURCES MATRIX

DATA ELEMENT	FEDERAL AGENCIES										STATE AGENCIES																			OTHER		
	EMERGENCY PREPAREDNESS	CORPS OF ENGINEERS	HOUSING & URBAN DEVELOPMENT	LABOR	GENERAL SERVICES ADMIN.	SMALL BUSINESS ADMIN.	TRANSPORTATION	AGRICULTURE	COMMERCE	HEALTH EDUCATION & WELFARE	EXECUTIVE OFFICE	AGRICULTURE	BANKING	CIVIL DEFENSE	COMMERCE	COMMUNITY AFFAIRS	EDUCATION	ENVIRONMENTAL RESOURCES	JUSTICE	LABOR & INDUSTRY	MILITARY AFFAIRS	PUBLIC WELFARE	REVENUE	TRANSPORTATION	PUBLIC UTILITIES	HIGHER EDUCATION ASSISTANCE	LOCAL GOVERNMENT	POSTAL SERVICE	RED CROSS	MATHEMATICA	DUN & BRADSTREET	UTILITIES	OTHER
ECONOMIC DEVELOPMENT (Cont'd)																																
New Dwelling Units Due to State Efforts															P																	
Rehabilitated Units Due to State Efforts															P																	
Dwelling Units Raised to Code Standards															P																	
Federal Projects Receiving State Aid															P																	
Local Projects Receiving State Aid															P																	
Damage Caused by Soil Erosion																	P															

CODE: P - primary
S - secondary
SD - secondary; greater detail than primary
SP - secondary; only covers part of category

Three problems were identified. They all relate to the first two sections of the data base, i.e., the real property damage section and the recovery expenditures section. The three problems involve:

(a) the basis on which damage estimates are made

(b) the problem of cash flow versus actual cost

(c) double counting.

There are three ways in which damage estimates were made. The first is replacement or repair costs, and the second is based upon economic or market value of the asset. These appear to be the approaches used as a basis for the damage estimates obtained from the Dun and Bradstreet survey and by the Small Business Administration in evaluating loans to individuals and businesses. The third and final measure used was book value. Book value is the basis upon which casualty claims are made by firms in establishing losses for tax credit purposes.

The combination of the first two measures is the most appropriate, if applied correctly. If, for example, the repair cost is less than the economic value of the asset, then the repair cost should be used as a basis for determining damage. If however, the repair cost turns out to be greater than the economic value, then the economic value should be used. From the standpoint of determining actual damage, book value is of the least value: It is only an accounting procedure for arriving at a value of an asset to determine the corporations profits and tax obligations. The procedure has very little relationship to the actual economic value of the asset. This problem with book value limits the desirability of using corporate tax returns as a basis for estimating real property damage incurred by corporations. However, the problem is counterbalanced by the fact that revenue data on corporate tax return has a much higher reliability than the replacement or economic value data obtained from the Dun and Bradstreet surveys which were obtained shortly after the flood and, as a result, may not have been based on a thorough evaluation.

The second problem is the problem of cash flow versus actual cost. This problem is related to the recovery expenditure section of the data base. It appears that most data available from the federal government, at present, reflects the actual outlay of cash to procure resources for the immediate emergency relief in the short-term recovery effort. Some of the expenditures were for assets which have a life longer than the short-term recovery time period, e.g., the procurement of trailers. If one is interested in using the data to determine the actual costs to the government then consideration must be given to the salvage or market value at the end of the period of the governments obligations. This same problem appears in the loans made to individuals and businesses. Since it is anticipated that many of the loans will be repaid, except for the $5,000 of forgiveness, then the actual cost to the federal government over the life of the loan is the $5,000 plus the difference between the prevailing interest rate and the 1% interest rate paid by the borrower over the life of the loan. It is not simply the amount of the loan.

The third problem identified is the possibility of double counting. Although a concerted effort to identify double counting was not pursued, two possible areas of double counting were identified; others may exist. The first is that associated with the Corps of Engineers and is discussed in Appendix F. The second potential problem identified is the possibility of double counting associated with Project Applications and the SPEED program. SPEED funds were used to provide labor for cleanup and restoration. The basic procedure followed was for eligible agencies to request that the Department of Labor provide the services of SPEED employees. These employees were then assigned to the eligible agencies for their use. It is possible that these same agencies submitted Project Application forms to the Office of Emergency Preparedness for funds to perform the same function. If this is true, then adding SPEED expenditures to OEP expenditures, would result in a double counting.

How these problems are handled or evaluated in the context of the data base will depend upon the general philosophy and final uses to which the data base will be applied. One possible approach would be to expand the damage and expenditure data base to include both approaches; that is, in the case of the second problem, to have a cash flow data base and an actual cost data base under the expenditures section. This would also apply to the other two problems.

APPENDIX A

TROPICAL STORM AGNES - THE EVOLUTION OF A RECOVERY SYSTEM

BACKGROUND

This appendix presents a chronology of the events directly related to tropical storm Agnes and relates them to the organization which evolved to handle the emergency, restoration and long-range recovery operations. In order to describe the enormity of the rescue, relief and immediate recovery effort expended by Federal, state and local governments, private organizations and citizens, the MITRE staff reviewed newspaper articles and other documentation. A summary of the highlights of the disaster is documented to provide a background of the disaster recovery. It serves as a reference to illustrate the phasing of the major efforts.

The detailed background begins before Disaster Day (D-Day on June 23, 1972) and provides a chronological series of events, decision points and activity descriptions. The objective of this technique is to illustrate how the interaction of all concerned produced an evolutionary system for long range recovery. Disaster Day is fixed at June 23, 1972, the day of President Nixon's declaration. Rescue and relief operations ended on the day the National Guard report was made, August 3, 1972. This last date is convenient to mark the beginning of the immediate recovery phase. A critical portion of immediate recovery was signalled by appointment of Frank Carlucci to head the Federal effort in Wilkes-Barre on August 12, 1972. His departure from that scene on December 15, 1972, marked the end of the initial stage of the immediate recovery. While the immediate effort will go on into 1974 and 1975, the initial stage of the long range effort began

as the Federal Regional Council issued guidelines for that two to ten year effort on state and regional planning entities on September 8, 1972. These parallel activities are shown in diagram form below in Figure A-1.

The reader will note references in the chronology to other disaster areas, the pre-disaster Federal posture, the day-to-day realization of the magnitude of the damages, continuous adjustment of all concerned to the job at hand, and the evolutionary emergence of a broad flood recovery policy.

The transition from emergency operations to "normal" or routine "business as usual" is apparent. The initial efforts exhibit a sense of urgency and mutual Federal, state and local attempt to face a common need; later in the chronology the reader will note the effects of bureaucracy, lack of a sense of urgency, emergence of local factions, attempts at financial gain and other indications that the crisis had ended. To a large extent, most individuals have been able to resume a normal existence even though it has meant sacrifices and hardships. For others, however, the disaster has not ended. It is this group of individuals which must be served by adequate immediate flood recovery programs; they cannot wait for long-term recovery. It is hoped that this chronology will assist in identifying these individuals and their immediate needs.

The chronology also exhibits the evolution of effective federal, state and local mechanisms for addressing the Agnes disaster. An integrated system for planning the long-range recovery needs of the Commonwealth has emerged which can effectively serve the diverse interests of the many parties affected by the Agnes flooding.

PRE-DISASTER FEDERAL POSTURE

The Federal Government's posture before the Agnes Disaster was a key factor in subsequent reactions and successful accomplishment of the rescue and relief operations and the initiation of the immediate phase of flood recovery. Two aspects of the Federal posture should

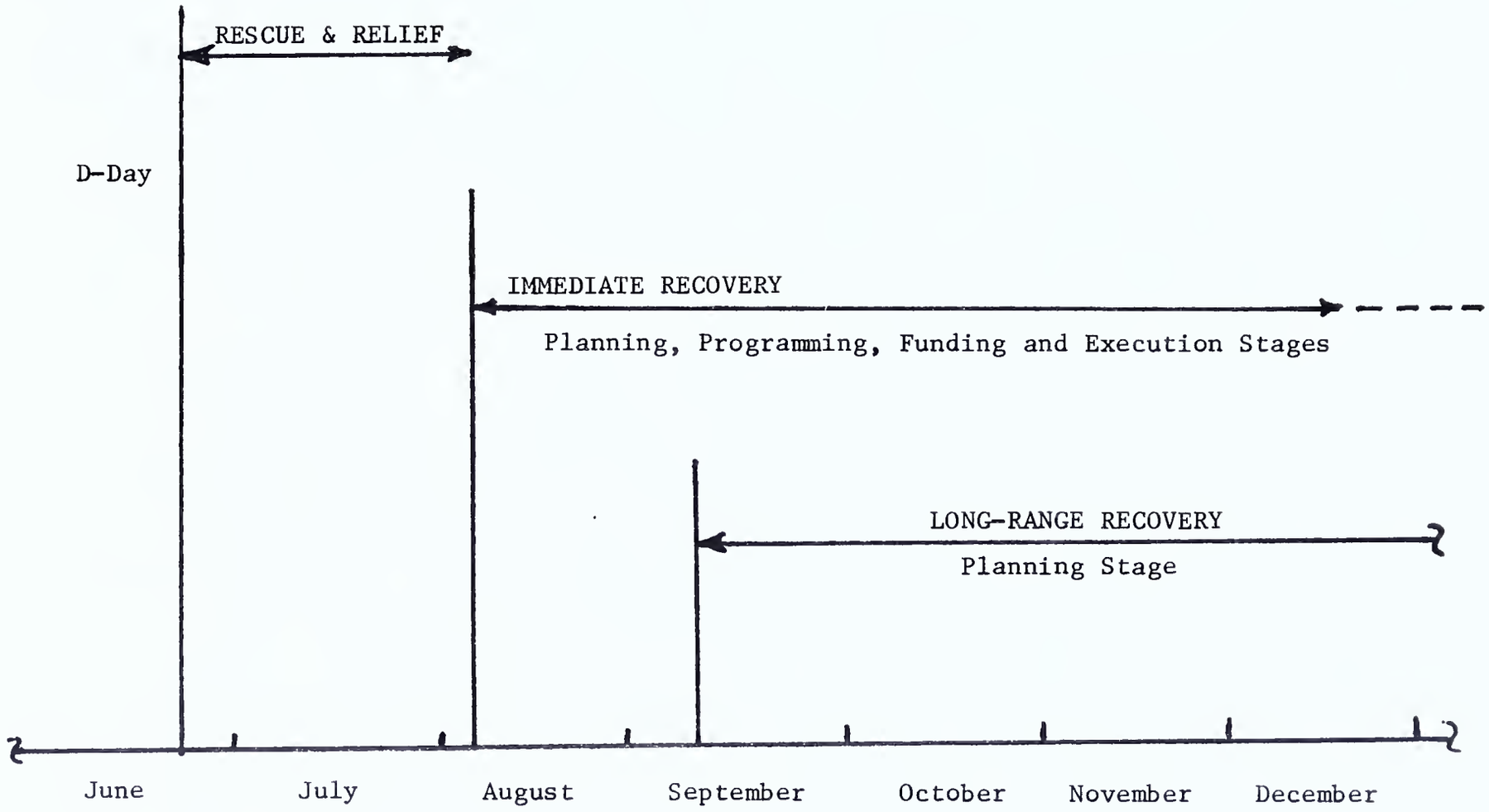


FIGURE A-1
PHASES AND STAGES OF RECOVERY

be noted. One, intergovernmental arrangements were in being which provided needed leadership and organization to support the massive job required. Two, the Office of Emergency Preparedness was already committed in other disaster situations.

Intergovernmental Arrangements

The White House Domestic Council, by Executive Order No. 11647, dated February 11, 1972, was reinforced with the establishment of an interdepartmental regional operations group composed of the Undersecretaries of Labor, Health, Education and Welfare, Housing and Urban Development, a Secretarial representative of Transportation and the representative of the Office of Management and Budget, the Environmental Protection Agency, and the Law Enforcement Assistance Administration. Coordination of field operations of the Undersecretaries' Group was directed to be performed by ten Federal Regional Councils (FRCs). This structure provided basic follow-on support to the Office of Emergency Preparedness for disaster relief and now acts as the Federal focus of support with a local coordinator in Wilkes-Barre. Subsequently, the Commonwealth of Pennsylvania created a counterpart to the FRC with its Council of State Agencies (CSA), and on August 28, 1972, Governor Shapp directed the formation of ten uniform state regions, through which state line agencies will operate.

Office of Emergency Preparedness

The committments of the Office of Emergency Preparedness (OEP) to other disaster areas provided a greater degree of responsiveness to the Agnes disaster than if no other disasters had occurred in 1972. 1972 is seen by many as a year full of disasters. Human and material resources under OEP direction were deployed in several disasters just before and during Agnes. Many of these assets were on line and transferred for use in the Agnes Disaster Area. This posture provided experience and pipelines for assistance in forms expandable to assist in the Susquehanna River Basin.

CHRONOLOGY OF EVENTS

The flood in the Commonwealth of Pennsylvania caused by Tropical Storm Agnes occurred in June, 1972. The flood came just as the Federal Government was terminating emergency operations in Rapid City, South Dakota after Rapid Creek flooded and killed upwards of 250 people. The South Dakota flood occurred on June 10, 1972 [25], ten days prior to the Pennsylvania Tropical Storm Agnes disaster. The South Dakota event is significant since the Federal Government had many of its Office of Emergency Preparedness (OEP) and other Federal agency personnel oriented and deployed for disaster assistance in South Dakota at the time of the Agnes flood in the Northeastern United States.

June 14, 1972 (D - 9): Farmers in Pennsylvania state that they are extremely worried about the excessive rainfall that has fallen since Spring. This rainfall has saturated the ground in the farming areas, causing all new rain to immediately run off [26].

June 15, 1972 (D - 8): The South Dakota flood death toll reaches 207 with 750 people still missing. The major problem in the South Dakota flood at this time is housing, and not food and clothing [27]. Tropical Storm Agnes starts as a tropical depression over the Yucatan Peninsula of Mexico [28].

June 18, 1972 (D - 5): Tropical Storm Agnes starts up the east coast, hitting the State of Florida and causing approximately

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[25] Harrisburg Patriot, June 11, 1972.
[26] New York Times, June 15, 1972.
[27] New York Times, June 16, 1972.
[28] Baltimore District Corps of Engineers, Tropical Storm Agnes, 1972 Report.

$8.2 million damage.[29] Mrs. Richard Nixon attends the memorial services for the 215 South Dakota flood victims recovered so far. The first rain from Tropical Storm Agnes starts to fall in the Northeastern United States.[30]

RESCUE OPERATIONS BEGIN

June 19, 1972 (D - 4): The full force of Tropical Storm Agnes is felt in the Northeast. Due to the already saturated soil throughout the Northeast the water immediately runs off into the rivers particularly the Susquehanna in New York and Pennsylvania, causing the river to rise quite rapidly.[31]

June 21, 1972 (D - 2): Tropical Storm Agnes starts to cause floods in Virginia, Washington, D.C., Maryland, Pennsylvania and Southwestern New York State.[32]

June 22, 1972 (D - 1): Governor Milton Shapp declares a state of extreme emergency in Pennsylvania with 62 out of the 67 counties reporting damage due to Tropical Storm Agnes.[33] The heavy rains have caused flooding of the Susquehanna, Allegheny, Schuylkill and Juniata Rivers. The total death toll in the Northeast as a result of Tropical Storm Agnes and the flooding reaches 26 with thousands being evacuated.[34]

June 23, 1972 (D - Day): President Nixon declares a major disaster for the states of Florida, Maryland, Pennsylvania, New York and Virginia. He directs General George Lincoln, Director of the Office of Emergency

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[29] Wilkes-Barre Times Leader, June 19, 1972.
[30] New York Times, June 19, 1972.
[31] New York Times, June 20, 1972.
[32] Baltimore District Corps of Engineers, Tropical Storm Agnes, 1972 Report.
[33] Governor's News Release, June 22, 1972.
[34] New York Times, June 23, 1972.

Preparedness to assure that all appropriate Federal aid is made available. All emergency relief operations are to be coordinated out of the Region III office of the Office of Emergency Preparedness in Philadelphia.

The flooding caused by Agnes has killed 31 and caused an estimated one billion dollars damage in Pennsylvania. The water reaches 37.2 feet in Wilkes-Barre and major flooding in that area and the total Wyoming Valley commences when many dikes are breached. Major Pennsylvania industries sustain heavy damage due to flooding, including the American Viscose Division of the FMC Corporation in Lewistown, the Piper Aircraft Company in Lock Haven, and the Interstate Baking Company in Wilkes-Barre, Pennsylvania.[35]

June 24, 1972 (D + 1): Forty people are dead and thirteen are missing. President Nixon views the flood by air and the Federal damage estimate is greater than one billion dollars.[36]

The President and the State establish a Federal office in Harrisburg to work with state authorities on the recovery programs. The water in the Wilkes-Barre area reaches the 40.6 feet flood level, 7.5 feet above the record flood of 1936. The 36 year-old dikes along the Susquehanna and the Wyoming Valley give way in many places forcing evacuation of hospital, police and downtown business personnel.[37]

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[35] Presidential News Release, June 23, 1972.
[36] New York Times, June 25, 1972.
[37] Flood Control, Wyoming Valley, U.S. COE, November 1972. It should be noted that the 24th of June was a Saturday and many people had left for the weekend leaving their businesses and homes unprotected behind them.

Another significant economic impact to the Wyoming Valley is extensive damage caused to the Penn Central Transportation Company's railroad tracks between Danville and Wilkes-Barre.[38]

Flooding in Harrisburg is extensive, with many buildings, especially on Front Street, suffering more severe damage than they had incurred in at least 42 previous floods.[39]

June 25, 1972 (D + 2): The flood waters from the Susquehanna start to recede.[40] Five Northeastern state governors, whose states had major damage attributed to Agnes, meet to coordinate their activities in Harrisburg.[41]

RELIEF OPERATIONS BEGIN

June 26, 1972 (D + 3): President Nixon states that the Federal Government should cut red tape and see that the flood victims of Agnes get Federal aid as soon as possible. Governor Milton Shapp states that the Agnes flooding is the worst disaster in the history of Pennsylvania.[42] Many of the OEP personnel assisting in Region VIII in the South Dakota disaster are shifted to the Pennsylvania Region III disaster area. The South Dakota flood death toll reaches 229.[43]

June 27, 1972 (D + 4): Flood waters have receded significantly in the Northern Tier Region of Pennsylvania. At least 100,000 residents of Wilkes-Barre are living in temporary shelters due to the floods. OEP local manager, B. Gallager states that the central city of

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[38] Times Leader, November 29, 1972. Damage to Penn Central's tracks caused them to submit an abandonment application on September 1 for the 51 mile freight line in Pennsylvania. On October 9, 1972, the notice of abandonment was posted in all Penn Central Stations along that line.

[39] Harrisburg Patriot, September 22, 1972. No flood plain zoning regulations had been adopted in the city of Harrisburg prior to the Agnes flooding.

[40] Sunbury Daily Times, June 15, 1972.

[41] New York Times, June 25, 1972.

[42] The Wyoming Valley Observer, 25 June to 1 July 1972.

[43] The New York Times, June 27, 1972.

Wilkes Barre will have to be completely rebuilt.[44] Total damage in the West Virginia, Pennsylvania, Maryland, Virginia and New Jersey areas from Agnes is estimated to be $1.63 billion. United States Flood Insurance Administor, G. K. Bernstein reports that the Federal Government has reduced costs of subsidized flood insurance by 40% in an effort to encourage wider purchase of the insurance and provide incentives for communities to implement flood plain management and flood control measures.[45] The Pennsylvania lottery states that it has lost its entire reserve supply of 45 million tickets, computer printing equipment and paper supplies in the flood.[46]

Internal Revenue Service agents are ordered into the eastern states to guard against price gouging as a result of the Tropical Storm Agnes flooding. President Nixon proposes a Health, Education and Welfare Bill which includes $200 million for disaster relief to flood victims in the five eastern states. President Nixon also asks Congress to approve an immediate $100 million Federal Emergency Relief Grant for the flood ravaged states of Pennsylvania, Maryland, New York, New Jersey, Virginia, and West Virginia.[47] Governor Shapp comments on the scarcity of funds and actions by Federal Government officials noting that one-stop relief centers have opened in Washington, D.C., which offer flood victims application blanks for such benefits as rent-free housing, home repair loans, compensation for crops and livestock, food stamps, unemployment compensation, and other assistance. He indicates that he would like to have such one-stop centers open in Pennsylvania as soon as possible.[48]

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[45] Wilkes-Barre Times Leader, June 30, 1972.
[46] The New York Times, June 28, 1972.
[47] The Harrisburg Patriot, June 28, 1972.
[48] Washington Post, June 29, 1972.
Harrisburg Patriot, June 29, 1972.

June 28, 1972 (D + 5): The death toll in the Rapid City, South Dakota flood reaches 230.[49]

June 29, 1972 (D + 6): The Appalachian Regional Commission, the Pennsylvania Department of Community Affairs and Congress request an estimate of the housing damage in the three state uniform planning regions suffering the bulk of damage caused by Agnes.[50] These regions are the Northern Tier Development Planning Commission (NTDPC), the Economic Development Council of Northeastern Pennsylvania (EDCNP), and the Susquehanna Economic Development Association (SEDA) areas.

Governor Milton Shapp and the Regional Director of the Office of Emergency Preparedness jointly sign a Federal/state disaster area assistance agreement. In this agreement the following persons are designated to execute certifications and otherwise act on behalf of the state. Lieutenant Governor Ernest Klein, the State Coordinating Officer will have overall authority and supervisory responsibility; Auditor General Robert Casey will provide the state's audits and certifications; Secretary of Supplies Frank Hilton will receive donations or loans of surplus property on behalf of the state and will execute certification and agreements. All inquiries for Federal assistance will be submitted to Dr. Richard Gerstell, Director of the State Civil Defense Office, who in turn will submit them to Lieutenant Governor Klein. It will be Dr. Gerstell's responsibility to maintain central files for all requests for assistance of any nature whatsoever.[51]

The U.S. House of Representatives passes Bill 325-9, Emergency Relief, to reduce the interest rate on Federal disaster loans retroactive to July, 1971 to aid the victims of the South Dakota and Tropical Storm

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[49]New York Times, June 29, 1972.
[50]Wilkes-Barre Times Leader, June 30, 1972.
[51]Governor's News Release, June 29, 1972.

Agnes floods. The bill makes 1% loans available to eligible recipients if the loan is totally repaid or 3% loans available if recipients chose the forgiveness option which requires them to repay only $500 of the first $3,000 of the loan.[52]

June 30, 1972 (D + 7): President Nixon declares the total state of Pennsylvania a disaster area making all counties in the state eligible for disaster assistance under the Federal Disaster Relief Act of 1970 (Public Law 91-606).[53] The Pennsylvania Department of Commerce issues the first flood unemployment estimates and indicates that the following key manufacturing plants may not reopen due to the flood: Bethelehem Steel Works in Steelton, The Piper Aircraft Company in Lock Haven, the Harrisburg Steel Works, the American Viscose Company in Lewistown, the Standard Steel Company of Burnham, and the Magee Carpet Company of Bloomsburg.[54]

Governor Shapp estimates that total losses to educational institutions and libraries resulting from the flooding is more than $55 million. Some 142 school districts have reported damage to 334 school buildings for an estimated total loss of $41,798,904. Eight state-owned or state-related colleges and universities have reported damage for an estimated loss of $3,542,350. Fifteen private or independent colleges and universities are damaged with an estimated loss of $8,472,443. Fourteen public libraries have sustained a damage loss of $1,655,000.[55] The Bell Telephone Company of Pennsylvania restores service to 29,500 telephones in Wilkes-Barre within 24 hours after the water recedes.[56]

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[52] Washington Post, June 30, 1972.

[53] President's News Release, June 30, 1972. On June 23, only 20 of the 67 counties in the state were eligible for disaster assistance. On June 26, seventeen more counties were added. With this Presidential declaration, the whole state became a disaster area.

[54] Pennsylvania Department of Commerce News Release, June 30, 1972.

[55] Governor's News Release, June 30, 1972.

[56] Wilkes-Barre Independent, July 2, 1972.

July 1, 1972 (D + 8): The President signs into law (PL 92-337) a supplemental appropriation bill providing for an additional $200 million for the President's Disaster Relief Fund administered by the Office of Emergency Preparedness. This amount, in addition to the regular fiscal year 1972 appropriations, makes nearly $300 million available for disaster recovery efforts. It is stated that 1972 has been unique in the history of the disaster programs. The President has made 27 declarations of disaster since January 1, 1972, 26 of them due to flooding.[57]

July 2, 1972 (D + 9): The total damage caused by Tropical Storm Agnes is now estimated to be greater than $2 billion.[58]

July 3, 1972 (D + 10): The Small Business Administration states that it will provide $500 million in loans to Agnes victims with the bulk of the funds to go to the state of Pennsylvania.[59]

July 4, 1972 (D + 11): The South Dakota death toll reaches 234 with nine still missing.[60]

July 5, 1972 (D + 12): Federal Disaster Assistance Centers similar to the one-stop centers that were opened in Washington, D.C., on the 27th of June are opened in the Commonwealth of Pennsylvania.[61]

July 6, 1972 (D + 13): The Small Business Administration estimates that more than $1 billion in loan money will be required to recover from Tropical Storm Agnes. This is more than twice the damage estimated three days earlier.[62] Pennsylvania House Bill 1754 is amended to provide $150 million of state disaster relief funds for the victims of Tropical Storm Agnes. The breakdown of this amendment is: $113 million for the Governor's Emergency and Disaster Relief efforts for

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[57] President's News Release, July 1, 1972.
[58] New York Times, July 3, 1972.
[59] Harrisburg Patriot, July 4, 1972.
[60] New York Times, July 5, 1972.
[61] Governor's News Release, July 7, 1972.
[62] New York Times, July 7, 1972.

alleviation of human hardship and suffering and for protection of property; $25 million for use by the Department of Public Welfare for assistance payments and county administration of public and medical assistance programs in connection with the flooding; $10 million for the Department of Health for any and all health services; and $2 million for the Department of Environmental Resources.[63]

July 7, 1972 (D + 14): Governor Milton Shapp announces that 22 flood information offices were opened on July 6 in Luzerne and Wyoming Counties, the areas most severely affected by the flood.[64] The Pennsylvania Attorney General suggests that preflood housing values should be used for all reimbursement due to flood damage.[65]

The President announces the appointment of Frank Carlucci (who will be later designated as the Presidential coordinator of the Federal Flood Recovery Task Force) as Deputy Director of the Office of Management and Budget. Prior to joining OMB he spent fourteen years as a foreign service officer with assignments in Africa and Brazil. He is a graduate of Princeton University (1952) and attended Harvard School of Buisness for one year. He is a native of the flood stricken area.[66]

July 10, 1972 (D + 17): Governor Shapp issues an eight point program of increased Federal Disaster assistance to Pennsylvania.[67] In this program he states that the property loss damage in Pennsylvania may be as much as $2.7 billion. The eight points are:

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[63] General Assembly of Pennsylvania House Bill No. 1754, Session of 1971, Re-reported as Amended, July 6, 1972.
[64] Governor's News Release, July 7, 1972.
[65] Letter to Governor, July 7, 1972.
[66] Presidential Release, July 7, 1972.
[67] Governor's Draft Eight Point Program, July 10, 1972.

- Housing. This program has the objective of providing modular housing, designed, built and occupied before winter sets in, on a demonstration basis to be followed by massive rebuilding in the spring.[68]

- Loan Financing. The Governor considers the $2,500 forgiveness factor to be too low and suggests that the Small Business Administration should refinance at 1% interest for 30 years all debts backed by assets destroyed by the flood.

  The Governor states that the SBA policy of denying loans because of age of applicants should be reviewed. The Governor also supports Senator Scott's proposal for a forgiveness factor of $12,000 to $15,000.[69]

- Mass Transportation. The Governor indicates the need for urban passenger services for flood victims. The Office of Emergency Preparedness has started a busline from the temporary housing units to downtown Wilkes-Barre which will operate until the summer of 1973.

- Urban Assistance. The Governor states that $250 million of extra urban renewal funds should be made available to the Commonwealth of Pennsylvania under Section 3 of the Housing Act.[70]

- Planning Finance. This program will provide a fund for disaster recovery planning and coordination. An allocation of $2.5 million for planning is proposed of which $0.5 million would be used for state planning agencies and $2 million would be given to Pennsylvania State Department of Community Affairs for distribution to the local communities.[71]

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[68] This modular housing idea was deferred due to lead times and costs of providing life support systems, prepared sites, adequate acquisition of sites and quality control problems. However, the temporary housing in HUD - supplied trailers and the effects of the Mini-Repair Program initiated by OEP under the Corps of Engineers postponed resolution of many of these problems. The Mini-Repair Program started out with a 100 house demonstration and ended with a 3,500 house overall repair program.

[69] Congress later raised the SBA loan forgiveness factor to $5,000, established a flat 1% interest rate for up to 30 years even though forgiveness was used and removed age of the applicant as a condition for obtaining an SBA disaster loan.

[70] The request for renewal funds was amended by HUD to provide a total of $400 million.

[71] Some 80% of these funds appear to have been allocated by the Federal government for use, e.g., $400,000 for the Office of State Planning and Development (OSPD).

- Tax Relief. Due to tax pressures on private property lost (estimated to be in the area of $2 billion in Pennsylvania), Governor Shapp urges a liberal interpretation of Section 241 of the Disaster Relief Act of 1970 (PL 91-606). [72]

- Repair of Recreational Facilities. The Governor states that only park and school recreational facilities may be repaired under Section 552 of the Federal Disaster Relief Act of 1970. He states that OEP officials have advised that other recreational facility damage is not covered if the facility is used exclusively for recreational purposes. The Governor requests funds for restoration of damage to all recreational facilities and areas.[73]

- Tax Calendar Adjustment. This program involves the use of the fiscal year for tax relief purposes. The Governor advises that because of an oversight in the Federal statutes some of the companies with accounting practices which are not based on a calendar year cannot adjust previous returns for Federal income tax losses due to the flood disaster. [74]

July 12, 1972 (D + 19): President Nixon asks Congress for $1.8 billion for flood relief. He states that some 80 persons have lost their lives and more than 128,000 homes and businesses have been damaged or destroyed by the flooding caused by Tropical Storm Agnes. Temporary shelter, feeding, and medical treatment have been provided for more than 350,000 people. President Nixon states that he thought that there should be no repayment required for the first $5,000 of SBA disaster loans and that these loans should be expedited so people could rebuild their homes and businesses. In order to speed recovery

[72] Corporations were subsequently given tax relief of both State and Federal taxes. Few local community property tax value assessment applications have been made to OEP. They are due by May 15, 1973.

[73] As a result of this point, OEP more clearly defined the definition of "exclusive" use. The Department of Interior (DOI) subsequently allocated $12 million through the Bureau of Outdoor Recreation to Pennsylvania for purely recreational facility restoration which by law could not be handled by the Federal Disaster Relief Act of 1970.

[74] This defect has been corrected by the Internal Revenue Service and both fiscal and calendar year Federal tax relief have been allowed.

efforts President Nixon also states that he has invited more than 500 mayors, county executives and other leaders of disaster struck communities to attend a special conference of Federal officials to be held in Washington on Friday, July 14, 1972. Presiding over the meeting will be Vice-President Agnew and the Deputy Director of the Office of Management and Budget (OMB), Frank Carlucci.[75]

July 13, 1972 (D + 20): The American Viscose Division of FMC Corporation announces that it will close its Lewistown plant causing a loss of some 2,400 jobs. American Viscose states that the plant was due to be closed at some later date and that the flood simply expedited its closing.[76]

July 14, 1972 (D + 21): The Governors and other state and local officials meet at the White House with Frank Carlucci, Deputy Director of OMB. Mr. Carlucci describes a multiplicity of avenues open for flood recovery assistance including such areas as $56 million of new funds plus $20 million of reprogrammed funds available for planning grants, local development district support, housing site development, alleviation of mine subsidence and economic reconstruction efforts. Also funds are available for restoration of both Federal aided and non-Federal aided highways. Public facilities in the towns can be repaired with funds available under PL 91-606 administered by the Office of Emergency Preparedness. The total OEP fund is $492 million. Water and sewage treatment facilities can be repaired and upgraded to establish water quality standards set by the Environmental Protection Agency (EPA) with the Department of Housing and Urban Development (HUD) assisting in this effort. The threat of future flooding will be handled by the Army Corps of Engineers (COE) with an accelerated flood protection program.

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[75] Presidential News Release, July 12, 1972.

[76] Harrisburg Patriot, July 14, 1972. This event caused probably the single most extensive economic impact of the whole flood. Lewistown is attempting to recover by itself through the development of an industrial park and attempting through advertising to attract new industry.

$1.3 billion of the $1.7 billion the President has requested will be used by the Small Business Administration (SBA) and the Farmers Home Administration (FHA) for loans to homeowners and businessmen.

After discussing the loans, Mr. Carlucci addresses what the local communities can do for themselves with the assistance of the Federal Government. As an example, he uses the City of Seattle which had high unemployment and also had a very dynamic Economic Development Council. Units of government, labor, and education joined with more than 200 Seattle area businessmen to promote both public and private investments in the Seattle area. This effort was assisted by the Economic Development Administration (EDA).[77]

July 15, 1972 (D + 22): Secretary George Romney of HUD states that 1,362 displaced families have been housed since the Agnes flood and that 17,000 housing requests are still pending.[78]

July 17, 1972 (D + 24): President Nixon sends a message to Congress with regard to disaster loans, supplemental appropriations, and highway emergency relief authority. His proposal is in three parts. First he proposes an Agnes Disaster Recovery Act of 1972. In this Act the

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[77] Statement by Frank Carlucci, Deputy Director of OMB, July 14, 1972. It is interesting to note that the single hardest hit area as far as total economics was the Susquehanna Sub-State Region. This planning region is served by the Susquehanna Economic Development Association (SEDA) which is not designated as an EDA Economic Development District (EDD) because of its lack of labor, education, and business representation. Its eligibility for EDA funds, therefore, has been questioned. One of the gaps in the Pennsylvania Flood Recovery effort might possibly be filled if SEDA were to become eligible for EDA assistance. The Capital area is having a similar problem in becoming eligible for EDA assistance.

[78] New York Times, July 16, 1972.

maximum amount of a loan principal that can be cancelled or forgiven will be increased from $2,500 to $5,000 for both Small Business Administration and Farmers Home Administration Loans. The forgiveness feature will be applicable to the first dollar of a loan rather than after repayment of the first $500 of the principal as is now the case. The interest rate on a loan will be dropped to 1% instead of its current rate of 5 1/8%.

Secondly, he proposes supplemental appropriations totalling $1,569,800,000 for this emergency, the largest single request of its kind in our history. The vast majority of these funds will be used for disaster loans with $1.3 billion going to the Small Business Administration and the remainder to the Farmers Home Administration. He requests an additional $200 million for the President's Disaster Relief Fund, $40 million for the Economic Development Administration, $16 million for the Appalachian Regional Commission and $12 million for the Corps of Engineers, all to assist recovery of damaged communities.

Thirdly, he proposes the existing authorization for highway emergency relief appropriations to be increased by $200 million. Currently the authority limits the amount to $50 million per year. To speed this message, President Nixon also sends a letter to the Speaker of the House of Representatives recommending the supplemental appropriations be initiated immediately.[79] The Small Business Administration states that it has disbursed 20 loans with 4,200 in process out of a total of 14,000 applications for the Commonwealth of Pennsylvania.[80] On this date flash floods hit Gallup, New Mexico.

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[79] President's Message to Congress, July 17, 1972.
[80] New York Times, July 18, 1972.

July 18, 1972 (D + 25): The Small Business Administration dispatches an ombudsman to the Commonwealth of Pennsylvania under the direction of Frank Carlucci of the Office of Management and Budget (OMB) to determine why the delay in dispensing Small Business Administration loans.[81] The Federal Regional Council (FRC) of Region III meets with the Governor to address comprehensive flood recovery planning. In this meeting Mr. Theodore Robb, head of the Federal Regional Council for Region III, states that it is imperative that the state have some kind of an organized flood recovery outline by the end of the month of July. In this discussion, a joint FRC and Commonwealth of Pennsylvania Tropical Storm Agnes disaster long range recovery process is outlined. In the outline the long range recovery efforts commence the following day, July 19, 1972 with the formation of an information collection plan due by July 31, 1972. Planned completion of the overall long range recovery planning task is December 30, 1972.[82]

July 19, 1972 (D + 26): Dr. Gert Eron, Assistant Professor of Civil Engineering at Pennsylvania State University and a member of the Institute for Research on Land and Water Resources at the University states that guidelines are necessary to avert repeat of floods. He states that even though less than 10% of the Commonwealth is occupied by flood plains. Most of the urban communities are crowded into that low, flat land. He further states that carefully considered steps should be taken to minimize the development costs when compared to potential flood disaster costs.[83]

July 20, 1972 (D + 27): Governor Milton Shapp testifies before the House Banking and Currency Committee concerning the extent of the disaster in Pennsylvania caused by Tropical Storm Agnes. In this statement he estimates that $2.5 to $3 billion damage has been

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[81] Harrisburg Patriot, July 19, 1972.
[82] FRC Long Range Recovery Process, July 19, 1972.
[83] Harrisburg Patriot, July 19, 1972.

sustained in Pennsylvania alone. He further states that 350,000 people are homeless in Pennsylvania and that 100,000 persons are either temporarily or permanently unemployed and that over $300 million in farm damage has been incurred in the state. Pennsylvania has over 80% of the total damage caused by Agnes, according to Governor Shapp's testimony.[84] After his initial comments to Congress he then outlines his eight point program for disaster relief for the state of Pennsylvania, the same program that was offered on July 10, 1972.[85]

July 21, 1972 (D + 28): The Office of State Planning and Development (OSPD) convenes its first state planning meeting with members from OSPD, the Pennsylvania Department of Community Affairs (DCA), the Susquehanna River Basin Commission and the FRC in attendance. During this meeting it is stated that DCA will handle all local area planning meetings and that they should be undertaken prior to July 31. The Office of State Planning and Development states that it will prepare a more detailed statement of their overall planning program.[86]

July 22, 1972 (D + 29): Bob Hope hosts a Disaster Relief Telethon which raises over $1 million in flood relief funds for assistance to the flood victims in Pennsylvania.[87]

July 24, 1972 (D + 31): Secretary Romney announces that HUD will provide 2,500 rent-free housing units to the Commonwealth of Pennsylvania for use for one year. These units will be made available in October prior to winter.[88]

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[84] Governor's Testimony before U.S. House Banking and Currency Committee, July 20, 1972.
[85] Governor's 8-Point Flood Recovery Program, July 10, 1972.
[86] Minutes of Meeting, July 21, 1972. The Office of State Planning and Development delivered its plan entitled, OSPD Long Term Flood Recovery Program Plan on August 31, 1972.
[87] Harrisburg Patriot, July 23, 1972.
[88] New York Times, July 24, 1972.

July 25, 1972 (D + 32): Frank Carlucci, in his capacity as Director of Regional Operations in the Intersecretaries Group of the Federal Domestic Council requests that the FRC deliver an initial plan of action for recovery from Tropical Storm Agnes to him no later than August 1, 1972. In this initial planning effort Carlucci emphasizes that the A-95 review system clearinghouse procedures for review of plans and programs should be used to avoid duplication of effort and to coordinate all planning.[89]

July 26, 1972 (D + 33): Theodore Robb, Chairman of the Federal Regional Council sends a letter to A. Edward Simon, Director of the Office of State Planning and Development. In this letter he states that a flood recovery work program should be generated to emphasize the following items:

- flood plain management to minimize potential damage
- analysis of areawide development opportunities including redevelopment alternatives
- approaches to areawide restoration and improvement of economic reliability
- approaches to areawide restoration and improvement of the environment in areas appropriate
- approaches to restoration and improvement of medical services delivery
- provisions for manpower development and employment of local unemployed
- enhancement of government and areawide institutional planning regulatory and implementation capabilities
- reinforcement of the A-95 process to intricately relate planning and development aspects of the entire recovery effort in order to assure maximum consistency between development action and policies.

[89] Memorandum, July 25, 1972.

Mr. Robb also states that Pennsylvania should include elements proposed at the July 25, 1972 meeting and that additional elements will come out of the DCA sponsored August 3, 1972 meeting with the sub-State districts. He emphasizes that the final work program should be comprehensive and stresses the need for speed in developing this program.[90]

July 27, 1972 (D + 34): An estimate of damage in the neighborhood of $500 to $750 million is published for the Wilkes-Barre area.[91]

July 29, 1972 (D + 36): Carl Enson, Chief of the Corps of Engineers Basin Planning Section in the Philadelphia district states that care should be taken in rebuilding damaged communities in areas subject to flooding. He emphasizes that flood control is not being abandoned especially where relocation would be socially unacceptable, however, the real key is to manage the land and water resources together not just management of the water resources alone to prevent flooding in a particular area.[92]

August 1, 1972 (D + 39): Portions of New Mexico are officially declared disaster areas due to flooding in that state.[93] Luzerne County economic impacts are estimated to be: 11,335 jobs, 2,728 commercial establishments, 25,000 dwelling units, 71,600 people affected and a total loss of $0.25 to $0.5 billion.[94]

August 2, 1972 (D + 40): The President transmits a message to Congress proposing an amendment to provide assistance to private non-profit educational institutions damaged by Tropical Storm Agnes and the South Dakota flood. This will be an amendment to the Disaster Recovery Act of 1972 which was sent to Congress on July 17, 1972.

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[90] Letter to OSPD from FRC Region III, July 26, 1972.
[91] Wilkes-Barre Times Leader, July 22, 1972.
[92] Pottsville Republican, July 29, 1972.
[93] New York Times, August 2, 1972.
[94] EDCNP Economic Impact Study, August 1, 1972.

This amendment is based on Office of Emergency Preparedness estimates that property loss and damage of private and non-profit educational institutions in the storm affected areas has exceeded $19 million.[95]

IMMEDIATE RECOVERY - INITIAL PHASE BEGINS

August 3, 1972 (D + 41): President Nixon signs House Resolution 15950 to bring the Emergency Highway Repair Fund to a total of $200 million for fiscal year 1973, and $100 million in subsequent years.[96] Railroads, specifically the Penn Central, request passage of the Emergency Railway Restoration Act to assist railroads in the recovery program due to the disaster. Governor Shapp issues Executive Directive Number 46 stating that the Pennsylvania Office of State Planning and Development (OSPD) will be the official flood recovery planning agency for the state of Pennsylvania.[97]

August 7, 1972 (D + 45): Housing and Urban Development (HUD) Secretary Romney is sent to Pennsylvania by President Nixon to resolve bureaucratic problems.[98] The Federal Regional Council issues an Office of Emergency Preparedness (OEP) damage assessment procedure covering both public and private assistance and designating which counties are included in which regions. This procedure also establishes Pennsylvania Municipal Information Centers.[99]

August 8, 1972 (D + 46): HUD Secretary Romney fires 25 temporary HUD employees for rudeness and bungling of the flood recovery efforts in the Wilkes-Barre/Scranton area.[100]

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95 President's Message to Congress, August 2, 1972.
96 This resolution became Public Law 92-361 and amends what had been a yearly total of $50 million.
97 Presidential Release, August 3, 1972.
98 New York Times, August 3, 1972.
99 FRC Memorandum, August 7, 1972.
100 New York Times, August 9, 1972.

August 9, 1972 (D + 47): Governor Shapp and HUD Secretary Romney hold a news conference in the Wilkes-Barre/Scranton area.[101] The Federal Regional Council issues its flood recovery work program format.[102] This format is to be used by OSPD in preparation of its initial work program. OEP issues flood statistics showing that more than $3 billion in total damage ($1.9 billion Federal Funds) was sustained in the Northeastern U.S. as a result of Tropical Storm Agnes.[103]

August 10, 1972 (D + 48): The Governor requests a Special Session of the General Assembly to convene on August 14, 1972.[104] The Small Business Administration loan applications total reaches $633,650,000.[105] Farm damage is placed at $250 million for Pennsylvania.[106] The Pennsylvania lottery begins operation for the first time since June 24.[107]

August 11, 1972 (D + 49): The first formal estimate of Federal Relief costs in Pennsylvania for Tropical Storm Agnes is projected at more than $2.2 billion by General George A. Lincoln, the Director of OEP. General Lincoln states that between June 16 and June 23

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[101] Wilkes-Barre Times Leader, August 10, 1972. This news conference may have led to the eventual selection of Frank Carlucci as the on-site Flood Coordinator for the President.

[102] FRC Draft Work Program Format.

[103] OEP Release, August 9, 1972. This damage estimate far exceeded past records such as the February, 1971 Los Angeles earthquake in which $425 million of Federal funds were required and the March, 1964 Alaskan earthquake in which $360 million of Federal funds were expended.

[104] Governor's News Release, August 10, 1972.

[105] New York Times, August 11, 1972.

[106] USDA Release, August 10, 1972.

[107] New York Times, August 11, 1972.

Agnes poured more than 28.1 trillion gallons of rain on the Eastern United States and that more than 1/2 million people suffered losses. 118,400 dwellings, mobile homes and farm buildings have been damaged and 5,800 businesses have been seriously devastated, for a total loss of more than $3.2 billion. Of the total, OEP calculates the private property loss amounted to at least $2.5 billion and losses to highways, communities and facilities accounted for some $700 million. Among the affected states, Pennsylvania will receive $1.2 billion of Federal money. In Pennsylvania more than 68,000 homes have been destroyed and nearly 3,000 small businesses have been damaged or destroyed. More than 69,750 families have suffered losses and many have been left homeless.[108] The Pennsylvania Department of Transportation estimates its total repair bill at $500 million for some 370 miles of highway and 245 state-owned bridges, 175 of which were completely washed out.[109]

August 12, 1972 (D + 50): President Nixon appoints OMB Deputy Director Frank Carlucci to take charge of the Federal Flood Recovery effort in Pennsylvania.[110]

August 14, 1972 (D + 52): Governor Shapp appears before a special joint session of the General Assembly of Pennsylvania to request a flood relief appropriation. Governor Shapp asks for an additional $100 million bond issue for urban renewal plus allowances for direct grants for and to individuals. Governor Shapp's $100 million bond issue will allow the Commonwealth to obtain $300 million of Federal funds on a 3 to 1 matching basis.[111] The U.S. House of Representatives appropriates $1.6 billion of additional flood relief money for the Tropical Storm Agnes disaster areas. Representative Daniel Flood of Pennsylvania states that the damage to the Wilkes-Barre area alone will exceed $1 billion.

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[108] OEP News Release, August 11, 1972.
[109] Penn DOT Release, August 11, 1972.
[110] President's News Release, August 12, 1972.
[111] Governor's Statement before Special Session of General Assembly, August 14, 1972.

August 16, 1972 (D + 54): House Resolution 15692 is signed allowing non-profit private educational institutions to receive disaster assistance money from the Federal government. President Nixon signs a bill authorizing low interest loans and aid to flood victims. The bill lowers the SBA and FHA interest rates from 5 1/8% to 1% as well as liberalizing aid to homeowners, farmers, small businessmen, the disabled and retired victims of Tropical Storm Agnes and the Rapid City, South Dakota floods. Under this bill the loan recipient does not have to repay the first $500 he borrows and in some circumstances he may not repay the first $5,000 of the debt, the balance bearing a 1% interest rate. This bill is unique to the South Dakota and Northeastern disasters and will apply only to loans from January 1, 1972 through July 1, 1973.[112], [113]

August 17, 1972 (D + 55): Federal Flood Recovery Coordinator Frank Carlucci institutes an emergency telephone system through OEP and an areawide long distance telephone system tied directly to his office to enhance communications. The overall federal emergency relief program is centered at Kings College in Wilkes-Barre on the 9th and 10th floors of the Holy Cross Hall.[114]

August 18, 1972 (D + 56): Portions of the state of Iowa are declared disaster areas due to flooding.[115] An interagency housing task force is instituted by the Office of Emergency Preparedness on this date. Members include:

- Chairman, William Swarm (OEP)
- Pennsylvania Liaison, W. Roy Newsom (Pennsylvania DCA)
- HUD Liaison, Casimir Ziolkowski (HUD)

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[112] President's News Release, August 16, 1972.
[113] Hazleton Standard Speaker, August 17, 1972.
[114] OEP Memorandum, August 17, 1972.
[115] New York Times, August 19, 1972.

- Special Projects, Edward Lehman (GSA)
- Task Force Reports, Joseph Ketchum (OEP)
- Public Information -- Wilkes-Barre, Lou Helm
- Public Information -- Harrisburg, William Tidball
- Corps of Engineers Liaison, Major James Brueggeman (COE).

The Corps of Engineers liaison office will handle temporary housing site development and pad design and construction. HUD will handle all applications or requirements for mobile homes, travel trailers and motel rentals. HUD will also be responsible for contracting, delivering and staging of all mobile homes. Mr. Newsom, the State liaison,officer will furnish status reports on temporary housing site selection, site design, development and occupancy of sites which are developed in the state. Task Force reports will compile, prepare and display statistics to reflect relief status and projections of temporary housing applications, requirements and occupancy data. The special projects section will be responsible for GSA mobile communications to facilitate site development and occupancy, and for temporary repair of homes in lieu of providing other temporary housing.[116]

Governor Milton Shapp announces the creation of a Flood Action Center with a special telephone hotline which is operational 24 hours a day. The center is located in the basement of the State Finance Building and will handle all liaison with State and Federal agencies in the flood recovery program and will promptly follow up any complaints with officials in these agencies. The Flood Action Center is to be operated by the Office of State Planning and Development.[117]

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[116] OEP Memorandum, August 17, 1972.
[117] Governor's News Release, August 18, 1972.

August 19, 1972 (D + 57): The Office of Emergency Preparedness reorganizes its staff and appoints C. D. Robinson as director for individual assistance. In his office there is an administrative division, a one-stop information center and responsibility for coordination of program specialists in the areas of education, medical health, home loans and small business loans. This office also provides assistance to individuals in such areas as temporary housing; temporary mortgage and rental payments; food coupons and surplus commodities; unemployment compensation and reemployment assistance; legal services for low income individuals; and the removal of wreckage and debris on privately owned land and waters if it is in the public interest.

OEP also reorganizes its public assistance program, appointing Joseph D. Winkle as the director of public assistance. Municipal information centers are opened under OEP auspices in Selinsgrove, Harrisburg, Hamburg, and Indiana.[118]

August 20, 1972 (D + 58): The President signs Bill H.R. 16254 (P.L. 92-393) which is the last of the three emergency measures he recommended to Congress in July for relief and recovery in the areas devastated by Tropical Storm Agnes and the flooding in South Dakota.[119] This bill provides additional funds of $1.6 billion and is the single largest appropriation for disaster relief in U.S. history. Recipients

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[118] OEP News Release, August 19, 1972. It would appear that, with the appointment of Frank Carlucci as the federal flood recovery coordinator on August 12, numerous changes were instituted within the federal recovery program in order to bring together all Federal, state, and local assistance agencies.

[119] President's News Release, August 20, 1972. It should be noted that the three emergency flood recovery measures took less than 40 days within Congress for passage.

of this money are the Small Business Administration, the Farmers Home Administration, and the President's Disaster Relief Fund. This latter fund will be used to rebuild and restore public facilities through the Office of Emergency Preparedness and the Economic Development Administration with smaller amounts going to the Corps of Engineers and the Appalachian Regional Commission.

President Nixon stated that Frank Carlucci has the Federal programs pulled together and coordinated and that assistance efforts are gaining momentum with progress evident on all fronts.

August 22, 1972 (D + 60): The plight of the aged victims of Tropical Storm Agnes is highlighted in a New York Times editorial. The editorial points out that a significant portion, some 30% of the victims of Tropical Storm Agnes in the Northeast, specifically in Pennsylvania, were either retired or nearing retirement and that these elderly victims have rather limited capabilities to recover from such a devastating disaster.[120]

August 23, 1972 (D + 61): Presidential candidate Senator George McGovern states that in his opinion at least $2.5 billion will be required to rebuild Pennsylvania.[121]

August 25, 1972 (D + 63): Consultants are brought in by the Department of Housing and Urban Development to manage and operate the Mobile Home Program with the specific objective to prepare 28,000 homes for flood victims before the onset of cold weather. This will be done by winterizing housing mainly in the mobile home area. A contract to the Boeing Company is in the $0.5 to $1 million range. Boeing has been selected primarily because of the firm's experience in housing management in the Seattle area, its general community development

[120] New York Times, August 22, 1972.
[121] New York Times, August 23, 1972.

work in Northeastern Oregon, and because of its planned communities for the Minuteman ballistic missile bases. The basic approach is to use engineering systems management techniques in the HUD temporary housing for the Wilkes-Barre area.[122]

August 26, 1972 (D + 64): Federal Flood Coordinator Frank Carlucci issues the integrated federal program organization charts showing the Presidential staff as well as the OEP overall federal coordination including the interagency housing task force, the individual systems program, and the public assistance program. A Public Information Office and Logistics Center and a State Coordination Office are also shown.[123]

August 28, 1972 (D + 66): Governor Shapp signs Executive Directive Number 48, designating ten uniform regions for overall substate planning. Four of these regions are designated for significant flood recovery efforts to include planning funded by EDA, ARC and HUD. These four regions are those served by the Northern Tier Development Planning Commission, the Economic Development Council of Northeastern Pennsylvania, the Susquehanna Economic Development Association, and the Capital Area.[124]

The Corps of Engineers makes its first report to the people stating that the Tropical Storm Agnes flooding is believed to be a 450-year flood at least at this point in their studies. The Corps announcement is made by Major General Richard H. Groves, the North Atlantic Division

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[122] Wilkes-Barre Times Leader, September 27, 1972. The public was informed of the Boeing contract on September 27.

[123] Federal Flood Recovery Coordinator Memorandum, August 26, 1972. The federal program organization was announced 64 days after the President had declared Pennsylvania a disaster area as a result of Tropical Storm Agnes.

[124] Governor's News Release, August 28, 1972.

Engineer and Colonel Lewis Prentiss, the Baltimore District Engineer. It is stated that the dike system in the Wyoming Valley that existed on June 23 was capable of withstanding only a 50-year flood because the dike system had subsided. Had it remained at its authorized level it could have withstood a flood of 100-year frequency.[125] The Corps also announced that it is working on a new plan which will raise the dike level to approximately 39 feet. It is also stated that if the dikes are raised to 39 feet, and the Tioga - Hammond and Cowanesque Reservoirs are completed, the combination will afford protection against a 300-year flood. In Wilkes-Barre, flood records have been kept continually since 1899. The flood of record prior to Agnes was that of March, 1936 with a maximum flow of 232,000 cubic feet per second. The flood in the Wilkes-Barre area is estimated to have been 415,000 cubic feet per second.[126]

August 29, 1972 (D + 67): President Nixon meets with HUD Secretary George Romney concerning the 13,382 temporary housing units installed within the last 9 weeks.[127]

August 30, 1972 (D + 68): Frank Carlucci in his "Report to the People" announces that HEW has spent $100 million in the Wyoming Valley. The $100 million includes restoration of hospitals and doctors and dentists offices destroyed by the flood waters; dental chairs; 100,000 blankets; and 6 complex package disaster medical supply units. HEW aid is helping 87 doctors return to their offices and is assisting in reopening 27 pharmacies; HEW grants to schools will assure resumption of classes in September.

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[125] This statement was later disputed and changed to clarify discrepancies as to why the dikes were some 3 to 5 feet below the required 36 foot height.

[126] Hazleton Standard Speaker, August 30, 1972.

[127] New York Times, August 30, 1972.

Mr. Carlucci also states that 30 new mobile home parks have been created to house the flood victims and that funds have been made available for 184 full and part-time police officers to patrol the new trailer parks and the surrounding areas.

During the same conference the State Department of Environmental Resources declares that it has provided for trash and garbage collection for the 30 new mobile home communities. In addition EDA states that it has started to process grants for 14 cities, towns and boroughs. EDA also indicates that it will conduct a systematic training program in fire protection for trailer park residents and fire companies responsible for protection of these parks.[128]

September 1, 1972 (D + 70): The plight of the farmer in the Northeast is highlighted in the press in an article which states that a political football is being passed around and around concerning the farmers needs.[129] Penn Central Transportation Company makes a Freight Line Abandonment Application between Wilkes-Barre and Danville.[130]

September 5, 1972 (D + 74): The Scranton Tribune presents an editorial concerning flood plains. In this editorial it explains that the term "flood plains" was virtually unknown outside a relatively small circle of experts and technicians knowledgeable in such flood oriented areas until Tropical Storm Agnes. The editorial points out that engineers have repeatedly talked about hedging protection against floods by developing a flood plain management system and even though millions and even billions of dollars have been spent on flood control since the 1936 flood, the fact that mushrooming residential and industrial development has occurred in valuable flood plains has caused the flood damage amount to rise even with the flood control expenditures.

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[128] Hazleton Standard Speaker, August 31, 1972.
[129] Pocono Record, September 6, 1972.
[130] Wilkes-Barre Times Leader, November 29, 1972.

The newspaper further states that urban expansion and development, which has paved over vast areas, changed land contours and made other alterations that contribute to the unnaturally rapid runoff of water in periods of heavy or protracted rain causing flood conditions to build up quickly. In conclusion the editorial points out that while dam construction and other flood control measures are necessary, an enlightened flood plain management system is critical to minimize future flood damage.[131]

The Commonwealth of Pennsylvania Department of Community Affairs prepares for a September 11 meeting to discuss the advisability of creating an agency such as the New York State Urban Development Corporation to operate in the Wyoming Valley. The Corporation would primarily be created to provide decent sanitary facilities and sound residential housing units. The Corporation powers would be exercised through four different types of housing projects: residential, civic, redevelopment and new community projects. The civic project, for example, would allow for the Corporation to purchase, construct or rehabilitate educational, cultural and utility facilities, roads and other civic projects and to sell and lease such projects to the state, a municipality or non-profit corporation composed of the residents or residential projects. The corporation would have the power to borrow money, make and issue bonds or other obligations of indebtedness not to exceed $1 billion.[132]

September 7, 1972 (D + 76): A joint FRC, state and regional planning meeting is held on this date regarding disaster recovery matters. In this meeting, the Federal representatives indicate that the Commonwealth work statement for flood recovery planning is generally acceptable and point out that Phase I of the planning effort is concluded.

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[131] Scranton Tribune, September 5, 1972.
[132] DCA Letter to EDCNP, September 5, 1972.

They state that since the Phase II planning effort requires input from local concerns, it can best be handled by the sub-state regional planning entities. The regional planning groups will receive HUD, EDA and ARC funds and will prepare their plans in consultation with the Commonwealth. In this meeting the Federal government states that it recognizes the Office of State Planning and Development (OSPD) as the lead state planning agency with responsibility for coordinating all functional planning undertaken by other state agencies and affirms that OSPD should serve as the A-95 Clearinghouse.[133]

The Federal and state officials also agree to send millions of dollars of Federal relief funds directly to the communities affected instead of through the Commonwealth of Pennsylvania. Frank Carlucci, President Nixon's personal representative in the disaster area, announces that the money will go through the multi-county Planning Agencies in regions damaged by the June storm. Under the agreement the Governors Office of State Planning and Development (OSPD) will channel the funds to the planning bodies in the damage areas. Some $2.5 mi lion in funds from HUD and the Economic Development Agency have been budgetted for flood relief planning with $250,000 already given to the state.[134]

Secretary George Romney of HUD compares Hurricane Camille with Tropical Storm Agnes. He points out that Camille occurred in 1969 and it took six months to provide 5,200 victims with temporary housing accomodations whereas 7,585 families in the Agnes flood areas were provided with housing in less than 3 months. Secretary Romney states that HUD has provided the Commonwealth of Pennsylvania with $250,000 for comprehensive flood recovery planning. The psychological impact of Tropical Storm Agnes upon children of the Kingston area draws national attention.[135]

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[133] FRC Region III Memorandum of Understanding, September 7, 1972.
[134] Harrisburg Evening Bulletin, September 8, 1972.
[135] New York Times, September 7, 1972.

LONG-RANGE RECOVERY - INITIAL PHASE BEGINS

September 8, 1972 (D + 77): The Federal Regional Council planning division sends a letter of guidance concerning the preparation of a long range recovery work program for flood recovery to the sub-state regional planning bodies. This letter includes guidelines for work program format, a discussion of the work program substance, and planning considerations for programs which are eligible for Federal assistance in the disaster areas. Included in the letter is Mr. Carlucci's memorandum which addresses the initial Federal thrust of this program.[136]

September 11, 1972 (D + 80): A meeting is held at EDCNP concerning the Community Development Corporation Act being proposed by Secretary Wilcox of the Department of Community Affairs. Heavy rains and flooding hit the Indiana County area of Pennsylvania.[137]

September 14, 1972 (D + 83): Governor Milton Shapp designates Secretary William H. Wilcox of the Department of Community Affairs to direct the work of all Commonwealth agencies in the flood stricken Wilkes-Barre/Wyoming Valley area. Mr. Wilcox will head the Governor's Council of State Agencies for Flood Recovery in the Wyoming Valley. This Council is made up of representatives of 10 Commonwealth agencies and is headquartered in Wilkes-Barre. Mr. Wilcox replaces Elliott R. Nauer, Deputy Secretary of the Department of Public Welfare.[138]

September 16, 1972 (D + 85): President Nixon inspects the Wyoming Valley. He is told that some 25,000 elderly people were affected by the flood and that $225 million has already been obligated to the Wyoming Valley alone for flood relief. Most of this money has been obligated through Small Business Administration loans. Priority has also been given to the restoration of the school system and local school

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[136] FRC Letter, September 8, 1972.
[137] Wilkes-Barre Times Leader, September 12, 1972.
[138] Governor's News Release, September 14, 1972.

districts which have received $12 million in federal funds. During President Nixon's visit Mr. Carlucci emphasizes that "the battle must be won before the winter ice freezes the homeless and snow walks the valley-with-a-heart".[139]

September 20, 1972 (D + 89): Colonel Prentiss, the Army Corps of Engineers District Engineer, holds a Flood Control Measures Conference in Harrisburg. He emphasizes that planning for flood prevention is the most important public business facing the Harrisburg community and that critical decisions must be made, not just engineering ones; but aesthetic, recreational, commercial, and developmental decisions. Colonel Prentiss states that there are four basic directions that flood protection can take:

(a) upstream impoundment to hold back the Susquehanna overflow
(b) building of higher dikes
(c) river channel improvements
(d) flood plain zoning regulations.

In the long run, Colonel Prentiss states that flood plain zoning which has been ignored after the previous 42 floods in the Harrisburg area, is the most sensible and least costly alternative.[140]

September 27, 1972 (D + 96): Attorney Paul E. Kanjorski joins the Flood Victims Action Council in the Wilkes-Barre area. (He will play a significant role in Council actions during the months of October and November.)[141]

September 28, 1972 (D + 97): President Nixon declares Indiana County a major disaster area as a result of heavy rains and flooding beginning on September 11. Preliminary estimates of damage to public and private

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[139] Wilkes-Barre Times Leader, September 17, 1972.
[140] Harrisburg Patriot, September 21, 1972.
[141] Wilkes-Barre Times Leader, September 29, 1972.

property in that flooded area exceed $2 million. The long-term, low-interest rate disaster loans recently enacted by Public Law 92-383 will be made available by SBA for the Indiana County area.[142]

September 29, 1972 (D + 98): The Flood Victims Action Council meets in Wilkes-Barre with Federal, state and local officials. During this meeting Mr. Wilcox states that the government was not equipped to deal with disasters of the magnitude of Agnes. Mrs. Min Matheson, Chairman of the Action Council denounces the spending of millions of dollars for roads, mortar and Wilkes College before assisting the people with their housing and welfare problems. Mr. Wilcox announces that the Council of State Agencies has placed an advertisement in the Wilkes-Barre Times Leader of September 30 asking flood victims to list their problems in obtaining flood recovery assistance.[143]

Secretary Wilcox announces that HUD has granted $40,000 to the Economic Development Council of Northeastern Pennsylvania to assist Wyoming Valley communities in qualifying for the Federal Flood Insurance Program. He states that communities must qualify for the Federal Flood Insurance Program before urban renewal and recreation grants can be approved and indicates that, as of January 1, 1973, grants would be witheld from all communities not fully-qualified for the program. Mr. Wilcox points out that before such applications are approved by HUD, a community must show that it intends to exercise reasonable control over future development in its flood prone areas and that only after this demonstration can the homeowners and businessmen of the community purchase low-cost flood insurance through insurance agents.[144]

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[142] President's News Release, September 28, 1972.
[143] Wilkes-Barre Times Leader, September 29, 1972.
[144] Scranton Times, September 30, 1972.

October 2, 1972 (D + 101): The $2.8 million Harrisburg modular home program has bogged down due to the lack of a precise delineation of the 100-year flood plain of the Susquehanna River in the Harrisburg area. HUD states that current guidelines prohibit any non-flood residential development within the 100-year flood plain. Another problem with the modular housing is the current confusion centering around the assignment of flood victims to modular housing and the possibility that, in the event that they are not purchased by the victims, they would simply be added to the already growing public housing system administered by the Harrisburg Housing Authority.[145]

October 4, 1972 (D + 103): Frank Carlucci indicates that the flood recovery effort is about to move from the emergency to the intermediate phase of recovery. He states that all disaster victims will be in winterized housing by the end of October. He indicates that the Corps of Engineers expects to have made approximately 2,700 home repairs under the Mini Repair Program by October 31, although to date only 700 of these repairs have been completed. Mr. Carlucci states that the intermediate phase will provide the social service requirements of mobile home tenants for the next year. He indicates that the long range problems will require many years to solve and will involve projects such as raising the dikes for adequate flood protection. Mr. Carlucci points out his attempts to obtain funds for the Tioga-Hammond and Cowansesque Reservoir projects on the Upper Susquehanna River watershed, projects vital to the flood protection plan of the Wyoming Valley. They are scheduled for completion in 1977 and 1979 respectively. Also it is stated that the Office of Emergency Preparedness has been financing local bus operations at approximately $6,000 per day since July, these grants, however, will expire on October 18, 1972.

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[145] Harrisburg Patriot, October 2, 1972.

He announces that EDCNP has been designated as a clearinghouse for all urban renewal grants in that region.[146]

October 11, 1972 (D + 110): Wage rates are still high for many jobs within the Wyoming Valley area with some carpenters, plumbers and electricians earning as much as $1,200 a week. However, the unemployment which was 6% before the flood is still at about the 12% level, but improving slowly.[147]

October 16, 1972 (D + 115): The Flood Recovery Task Force, a local Wyoming Valley institution established by Federal Judge Max Rosenn and funded by the Economic Development Administration, criticizes the Small Business Administration for their slowness in providing financial aid to local business. Joseph Clarke, the Deputy Director of Region III for SBA states that $5.3 million has been loaned locally to some 1,075 businessmen who have applied for assistance. He also states that of the 25,517 applications for SBA home loans approval had been given to 24,297.[148]

Urban renewal money is stated to be $300 million for the state of Pennsylvania to be matched with $100 million to be raised with a state bond issue. Many complaints have been received throughout the state due to the slowness of the urban renewal development effort. There is much confusion in the state concerning whether individuals should apply for SBA loans to repair their homes before the SBA loan application deadline or whether their property will be taken by redevelopment authorities under urban renewal programs.

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[146] Wilkes-Barre Times Leader, October 4, 1972.
[147] Wilkes-Barre Times Leader, October 16, 1972.
[148] Wilkes-Barre Times Leader, October 17, 1972. A review of the OEP statistical report of September 22 indicates that only 913 small business loans had been approved and that only $10 million out of an approved $63 million in small business loans had actually been disbursed as of September 21. This amount is out of $216 million requested for business restoration in the whole Commonwealth of Pennsylvania.

HUD is holding the communities to meet a deadline of April 30, 1973 for completion of extensive studies concerning Phase I and II of their urban renewal applications. It is stated that the city of Wilkes-Barre is off to a fast start because they have had a ten year redevelopment program in the works and were prepared to submit an early application.[149]

Representatives of the Luzerne County Redevelopment Authority and the Wilkes-Barre Redevelopment Authority agree to begin a crash study designed to supply definite answers concerning rehabilitation and renewal to flood victims by December 15, 1972. Secretary William Wilcox of DCA announces that he is calling a state and local officials meeting to speed the process of providing more definitive information to the flood victims. During this session various aspects of the post-flood property rehabilitation are discussed between the representatives of other levels of government and a group representing the Flood Victim Action Council (FVAC). Vigorous debates, usually between Attorney Paul Kanjorski, Legal Council for the FVAC, and redevelopment officials occur. After the meeting, Secretary Wilcox states he saw three positive results of the conference: (a) mutual commitments to attempt a crash program of information; (b) the general agreement on the need for interim assistance on the Valley's West side; and (c) an agreement on the need for increased citizen input into the planning stages of redevelopment.[150]

October 17, 1972 (D + 116): The Delaware Valley Regional Planning Commission estimates that open land in the Philadelphia suburbs is being developed at a rate of more than 8 square miles per year, and indicates that it now takes approximately half as much rain to cause minor flooding than prior to World War II. The Commission

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[149]Wyoming Observer, October 15-21, 1972.
[150]Wilkes-Barre Times Leader, October 17, 1972.

emphasizes that new and effective flood control protection must take the rate of urbanization into account in future flood control plans.[151]

Leon Corbett, the Wilkes-Barre city engineer, states that flood debris clearance is still costing the city $6,880 a day as a result of the flood damage last June.[152] It is estimated that the Wilkes-Barre and Wyoming Valley regions have suffered more than $1 billion damage in the Tropical Storm Agnes flooding and are now in the throes of a massive rebuilding effort with 40,000 people living in temporary government-provided shelters and nearly 1,000 stores and small plants still closed.[153]

October 20, 1972 (D + 119): Mr. William Conner, executive assistant to Frank Carlucci states that the Federal government will program $400 million for flood-related urban renewal projects in Pennsylvania. These projects will be handled out of a special processing center at the Lackawanna County office building in Scranton. All Federal agencies connected with the urban renewal effort will use the most advanced application of systems techniques in the country to speed the urban renewal grants. The money will be used to acquire badly damaged properties at preflood value and to redevelop the areas damaged by Agnes. Mr. Conner indicates that the Federal Flood Recovery Task Force has been working intensively to help redevelopment agencies and local officials in Northeastern Pennsylvania to determine the areas that will be picked for urban redevelopment so that the householders and businessmen can make decisions on what to do with their property. It is stressed that substantial sums are still available through the Small Business Administration in the form of 1% loans for a period of up to 30 years for house repairs in areas

[151] Philadelphia Inquirer, October 18, 1972.
[152] Harrisburg Patriot, October 18, 1972.
[153] New York Times, October 20, 1972.

not scheduled for urban renewal. Mr. Conner emphasizes that all urban renewal applications are being analyzed extensively to determine what areas should be designated as tracts to be cleared with HUD assistance and those which should be rehabilitated with the help of SBA and other agency loans.[154), 155]

Secretary Wilcox of the Department of Community Affairs maps out a Federally financed plan which would provide more responsive recovery assistance in future disasters. This plan involves the development of special 20-member disaster teams trained during the year like Army reserve units and ready to leave for a devastated area in 2 hours.

According to Secretary Wilcox, after Agnes, it took six weeks to get moving. This plan would be operational within 48 hours. To present his plan, Mr. Wilcox uses the example of 40,000 families made homeless in a hypothetical California earthquake. (Tropical Storm Agnes left about 27,000 families homeless in seven states causing about $3.1 billion in overall damage according to the Federal Office of Emergency Preparedness.) Wilcox stated that 20,000 collapsible housing units (such as those used by the Air Force) could be flown or trucked into an area within five days as contrasted to the four months that it took to get temporary housing into place after Agnes for 10,000 families. The collapsible units would arrive with chemically-treated toilet pans, emergency rations and enough furniture for emergency use. The units would cost approximately $3,500 each; however, they would only be used for one disaster and then discarded unlike the trailers currently supplied by HUD. Payment for such a program would be through an extra property insurance fee which would go into a Federal trust fund for national disasters.[156]

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[154] Wilkes-Barre Times Leader, October 20, 1972.
[155] Washington Post, October 20, 1972.
[156] Harrisburg Patriot, October 20, 1972.

October 21, 1972 (D + 120): Frank Carlucci announces that the SBA disaster loan filing deadline is extended to January 15, 1973. This is the second extension of the loan deadline which was originally set for September 30, 1972. Mr. Carlucci reveals that the Federal flood relief aid for Pennsylvania will soon reach a total of $1.8 billion. Mr. Carlucci states that the HUD five point backup system proved to be an initial success when the cold weather arrived. The five point system includes: (a) vacant heated mobile homes on occupied groupsites, (b) vacant heated mobile homes on unoccupied group sites, (c) vacant mobile homes now used by construction crews, (d) vacant mobile homes in staging areas, and (e) vacant group sites ready for mobile homes to be placed and connected. The mobile home skirting program is proceeding on schedule according to Mr. Carlucci with more than 1,100 work orders having been issued by HUD to contractors. Skirting the mobile homes helps cut fuel costs, prevents freezing of water and sewer pipes and improves the appearance of the dwelling. It is also stated on this date that urban renewal planning money would be made available to communities by November 1, 1972.[157] In the Wyoming Valley area, 14 planning and survey applications have already been prepared to cover a total program costing $321,000,000 in Federal and state funds. The 14 proposed urban renewal projects constitute a total of 5,570 acres. The total number of structures involved is close to 20,000.[158]

October 24, 1972 (D + 123): The Pennsylvania Department of Transportation (Penn DOT) is to receive $27,000,000 from the Federal government for state road and bridge restoration. An advance amount of over $1,000,000 already has been received.[159]

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[158] Wilkes-Barre Times Leader, October 21, 1972.
[159] Wilkes-Barre Times Leader, October 22, 1972.
Harrisburg Patriot, October 24, 1972.

November 29, 1972 (D + 159): The Penn Central Transportation Company's attempt to abandon the 51 mile freight line between Danville and Wilkes Barre brings protests from local citizens and businessmen. Penn Central indicates that the line was in disrepair before Agnes and states that the cost would be approximately $700,000 to restore service not counting the flood damage. Other protests come from manufacturers and other shippers in upstate New York, New England and Canada who have a special interest in preserving the Penn Central interconnection with the Delaware and Hudson railway at Penn Central's Buttonwood Yard near Wilkes-Barre.[160]

November 30, 1972 (D + 160): SBA disaster loan approvals amount to almost $210 million for home loans and $71 million for business loans in Luzerne County. SBA home loans for Dauphin County amount to $38 million and $22 million for businesses. Lycoming County has the third highest number of loan applications and dollar amounts for SBA loans with almost $18 million in home loans and almost $8 million in business loans.[161]

IMMEDIATE RECOVERY - INITIAL PHASE ENDS

December 15, 1972 (D + 175): Mr. Frank Carlucci returns to Washington from Wilkes-Barre. Representatives of the Federal Regional Council Region III withdraw to Philadelphia. Administration of the immediate recovery effort has reached a routine stage. Efforts are now directed to the long range recovery effort by the planning community.

December 20, 1972 (D + 180): In a nationally syndicated column, Jack Anderson reports what he calls "bureaucratic havoc wrought by Frank Carlucci." He states that he has evidence of mismanagement, miscalculations and possible malfeasance in the relief and recovery operations.[162]

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[160] Wilkes-Barre Times Leader, November 28, 1972.
[161] Harrisburg Patriot, November 30, 1972.
[162] Washington Post, December 20, 1972.

January 29, 1973 (D + 220): Mental health researchers are still working in the Black Hills of South Dakota. A group of 50 paraprofessionals is in Wilkes-Barre helping flood victims to cope with the mental and physical problems of returning to normal.[163]

February 1, 1973 (D + 223): Seven months after Tropical Storm Agnes caused the closing of its major industry, Lewistown is returning to normal. Although unemployment is still at 12%, the Standard Steel Corporation in nearby Burnham, is back to normal and new industry has begun operations in Lewistown. The City's national campaign, called Project Recovery, to attract new industry and to help rebuild the old appears to be a success.[164]

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[163] Newsweek, January 29, 1973.
[164] Harrisburg Patriot, February 1, 1973.

THE RECOVERY SYSTEM

The preceding chronology illustrates the flow of decisions which were made to meet the immediate needs of the disaster area. The pre-flood posture of the federal government and the intense commitment of Presidential and Congressional support provided a highly responsive and timely assistance to the disaster area. The Commonwealth of Pennsylvania Government provided close support through the State Civil Defense system and established communications with flood victims with an OSPD operated "hot-line" to the Capitol. The regional councils provided existing planning mechanisms. The local flood recovery teams worked rapidly. Taken together, these combined resources successfully provided a means to supply immediate relief to the victims of the disaster, completed the initial stages of immediate recovery and provided the background for the long-range flood recovery effort.

The organization and operations which evolved from the pressure of events were not always clear to those engaged in a single part of the vast effort. The sheer magnitude and scope of the disaster relief and assistance operations required by Tropical Storm Agnes tended to obscure the lines and directions of the coordinated and cooperative activities undertaken. The large number of participants tended to make the overall effort seem less organized and effective in the eyes of any single observer than it actually was. To some extent this view is justified since key solutions to many problems were solved by quick decisions "in the saddle," so to speak, without precedence or wide-spread consultation.

The following paragraphs describe the organization which emerged from the combined efforts of Federal, state, regional and local government. The organization and the concept of operations

associated with Tropical Storm Agnes constitute an improved disaster recovery system which may be the basis for further evolutionary improvements in national ingenuity and concern for future disasters.

Organization

Figure A-2 depicts the Intergovernmental Flood Recovery organizations and represents the key decision centers and administering agencies involved in the rescue and relief operations and the immediate and long-range recovery efforts. Local recovery task forces and municipal governments are being assisted by this evolutionary system.

National Members

Executive Order Number 11647, February 11, 1972, reinforced the Domestic Council of the White House by establishing an interdepartmental regional operations arm composed of two entities. One, the Undersecretaries' Group for Regional Operations, is composed of the Undersecretaries of Labor (DOL), Health, Education and Welfare (HEW), Housing and Urban Development (HUD) and Transportation (DOT); the Administrator of the Law Enforcement Assistance Administration (LEAA); Deputy Administrator of the Environmental Protection Agency (EPA), and the Associate Director of the Office of Management and Budget (OMB). Two, Federal Regional Councils (FRC's) were established for each of the ten standard multi-state Federal regions. Each Council is composed of senior operating executives of the agency membership in the Undersecretaries Group (DOL, HEW, HUD, DOT, LEAA, and EPA).

The Undersecretaries Group for Regional Operations shall . . . "establish policy with respect to Federal Regional Council matters, provide guidance to the Councils, respond to their initiatives, and seek to resolve policy issues referred to it by the Councils."

The functions of the Federal Regional Councils include:

(a) the development of short-term regional interagency strategies and mechanisms for program delivery

(b) the development of integrated program and funding plans with Governors and local chief executives

(c) the encouragement of joint and complementary grant applications for related programs

(d) the expeditious resolution of interagency conflicts and coordination problems

(e) the evaluation of programs in which two or more member agencies participate

(f) the development of long-term regional interagency and intergovernmental strategies for resource allocations to better respond to the needs of states and local communities

(g) the supervision of regional interagency program coordination mechanisms

(h) the development of administrative procedures to facilitate day-to-day interagency and intergovernmental cooperation.

The Office of Emergency Preparedness (OEP) of the Executive Office of the President maintains a fully functioning Field Operations Directorate responsible for Federal disaster relief operations. Elements of the Army Corps of Engineers, Air Force and Navy resources were employed rapidly, as a result.

The existence of OEP and FRC machinery at the time of Tropical Storm Agnes provided a remarkable national aggregation of readily available human, financial and material resources to the disaster-stricken, multi-state area. To expedite and coordinate Federal assistance to the disaster area, the President sent his personal representative, chairman of the Undersecretaries Group, to lead the Federal Flood Recovery Team.

Commonwealth Members

In keeping with standard procedures established by state law, the State Council on Civil Defense maintained a posture permitting

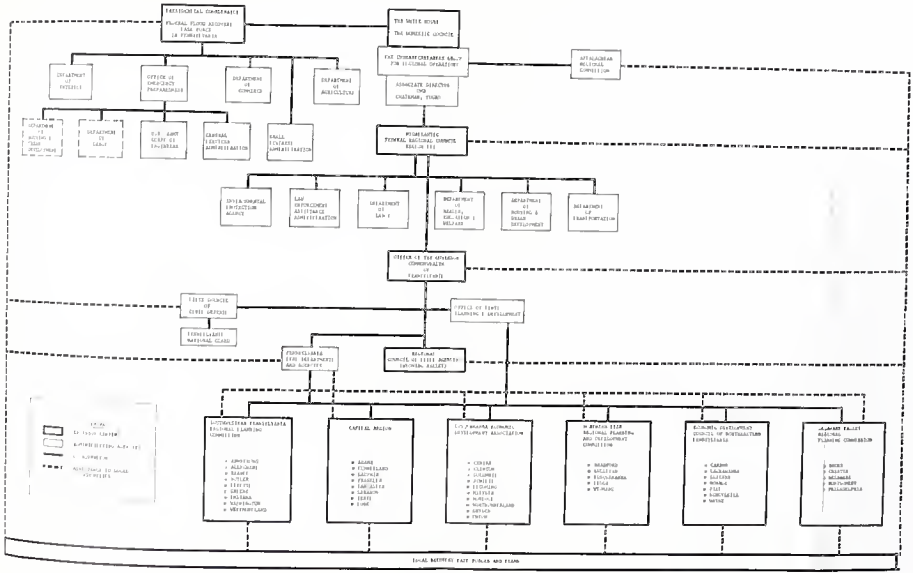

FIGURE A-2
THE INTERGOVERNMENTAL FLOOD RECOVERY ORGANIZATION

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immediate response to Agnes. The Governor of Pennsylvania used his National Guard in cooperation with Federal relief forces.

The Governor established a Regional Council of State Agencies for the Wyoming Valley and appointed the Secretary of Community Affairs as Chairman of that interdepartmental group in order to improve the state's assistance delivery system. The Governor ordered the adoption of ten uniform State Agency Planning Regions, thus, incorporating areas of the seven year old set of multi-county development districts, Local Development Districts (LDD's) of Appalachia, and the Economic Development Districts (EDD's) of the Economic Development Administration, with the Delaware Valley Regional Planning Commission and with the counties around the Capital area (Adams, Cumberland, Dauphin, Franklin, Lancaster, Lebanon, Perry, and York).

Regional Members

The multi-county development districts contained an available and competent planning capability for immediate deployment in support of the recovery effort. The Economic Development Council of Northeastern Pennsylvania, the Northern Tier Regional Planning and Development Commission and the Susquehanna Economic Development Association were designated as lead agencies for flood recovery planning, for the Project Notification and Review System set up by the OMB Circular A-95 (amended) and, in some cases, for Operation Breakthrough coordination. With their existing advisory, promotional, research, educational, and informational functions, these regional entities have slowly become key partners with county governments in region-wide recovery.

Volunteer Members

Not shown in Figure A-2 are the volunteer services representing an asset so far underused in the recovery effort. While these agencies were in the vanguard of rescue and relief operations, many volunteers

were subsequently unable to serve in a capacity fitting their abilities and serving needs of regional scope. This situation is particularly evident in the field of information services to local citizens.

SUMMARY

The Intergovernmental Organization, described above, constitutes a complex workable recovery system that appears to have performed a relatively sophisticated and highly responsive series of activities. A large number of interdependent decisions were made continuously and simultaneously by the array of agencies composing the recovery system. For this reason, the system's teamwork successfully compressed and accelerated the planning activities of immediate recovery.

During the first six months and after rescue and relief operations had been nearly completed, the leading role in the recovery system was played by the Federal Flood Recovery Task Force with its massive support rendered by the Federal Government. Immediate recovery is being accomplished quite successfully and rapidly; as a result the Federal government has retired to a preflood posture.

Now, during the remaining stages of the immediate recovery, the State and Regional entities will be playing the lead role. These entities will be the organization responsible for linking the immediate recovery effort with the long-range recovery effort. This document was written to set the stage and provide a common baseline for the articulation of an outline plan for long-range flood recovery.

The recovery system that evolved will be the backbone of the longer range recovery efforts within the Commonwealth. The concept of operations that emerged during the disaster and subsequent immediate recovery efforts must continue to be refined in order to effectively address the future recovery operations. More local and public involvement will be required with state and Federal agencies primarily providing the coordination and some funding to insure an orderly progression of events.

APPENDIX B

STRUCTURED VALUE ANALYSIS PROGRAM USER'S GUIDE

INTRODUCTION

This appendix describes the Structured Value Analysis (SVA) program used in the Urban Renewal Analysis in order to assist the user in the preparation of the required input data and in the interpretation of the computer output.

In the following sections the terminology of SVA is discussed and a general overview of the operation of the SVA program is presented. This discussion is followed by a description of the required data input cards together with sample inputs and outputs. The program listings are also presented.

TERMINOLOGY

(a) System: The set of projects which a user wishes to evaluate.

(b) Parameters: The attributes which describe the system being evaluated. For example, the percent of buildings to be demolished is a parameter for an urban renewal program.

(c) Parameter Measurement Scale: The allowable range over which a parameter can be quantified. For example, if the parameter is a measure of the percent of buildings to be demolished, the measurement scale ranges from zero to one hundred percent.

(d) Parameter Measurement Function: The function by which a parameter is quantified. This may be an explicit equation or a judgement.

(e) Parameter Data Point: The specific value of the parameter on the Parameter Measurement Scale.

(f) Value Scale: The scale for measuring the intrinsic utility of a parameter. Zero represents minimum utility and one represents maximum utility.

(g) Value Function: The function which relates each Data Point of the Parameter Measurement Scale to a specific point on the Value Scale. This may be an explicit equation or judgement.

(h) Value Point: The value of a specific Data Point, measured on the Value Scale.

(i) Parameter Weight: The relative importance of each parameter to the entire system.

(j) Value Set: The structure for calculating the Parameter Value Points. The Value Set consists of the Parameter Measurement Scale, the Value Functions and the Parameter Weights.

(k) Data Set: A set of Data Points consisting of one Data Point for each parameter.

(l) Variation of a Data Set: A set of Data Points calculated by varying the Data Points of a Data Set by a pre-determined amount. For example, if the area of an urban renewal project is cut in half, the Data Points associated with this reduced project are a variation of the original project.

(m) Candidate Sets: A set of alternative Data Sets. For example, if several urban renewal projects are being evaluated, each would provide a separate Data Set.

(n) Model: The mathematical function for combining the weighted Value Functions.

(o) Term: Parameter Value Functions which are combined additively in the Model.

(p) Factor: Parameter Value Functions which are combined multiplicatively in the Model.

(q) Structured Value: The value which results when a Data Set is evaluated by the Model.

GENERAL OVERVIEW OF THE SVA PROGRAM

The SVA program is written in a modular form in order to increase the program's flexibility and to allow the user to adapt the program to his requirements. The program is written in FORTRAN IV and has been implemented on an IBM System 360 model 50 computer.

There are five tasks performed by the program. These tasks are as follows:

(a) Build a Value Set (subroutine BUILDV)

(b) Build a Data Set (subroutine BUILDD)

(c) Evaluate the Data Set (subroutine EVAUL)

(d) Perform a sensitivity analysis on the Data Sets (subroutine SENANL)

(e) Perform a sensitivity analysis on the Parameters (subroutine SENSI)

The program consists of a main program and ten subroutines. Figure B-1 presents the job flow.

The program operates by setting up a job processing sequence. At each step of the sequence, one of the above five tasks is performed. An option code read in for each step specifies the task to be performed at that step.

The main program and the five major subroutines are discussed below.

Main Program

The main program reads in the control variables, such as the number of processing steps and the option code for each step, and at each step calls the appropriate subroutine. At the conclusion of each step, control again reverts to the main program.

Subroutine BUILDV

Subroutine BUILDV builds a Value Set. This subroutine reads in the Parameter Measurement Scale, the Parameter Weights, and the data used to define a Value Function. If a Value Function is piecewise linear, subroutine SLOPE is called to calculate the slope along each segment of the Value Function. The Value Set is printed out and if requested, written on a file. Control is then returned to the main program.

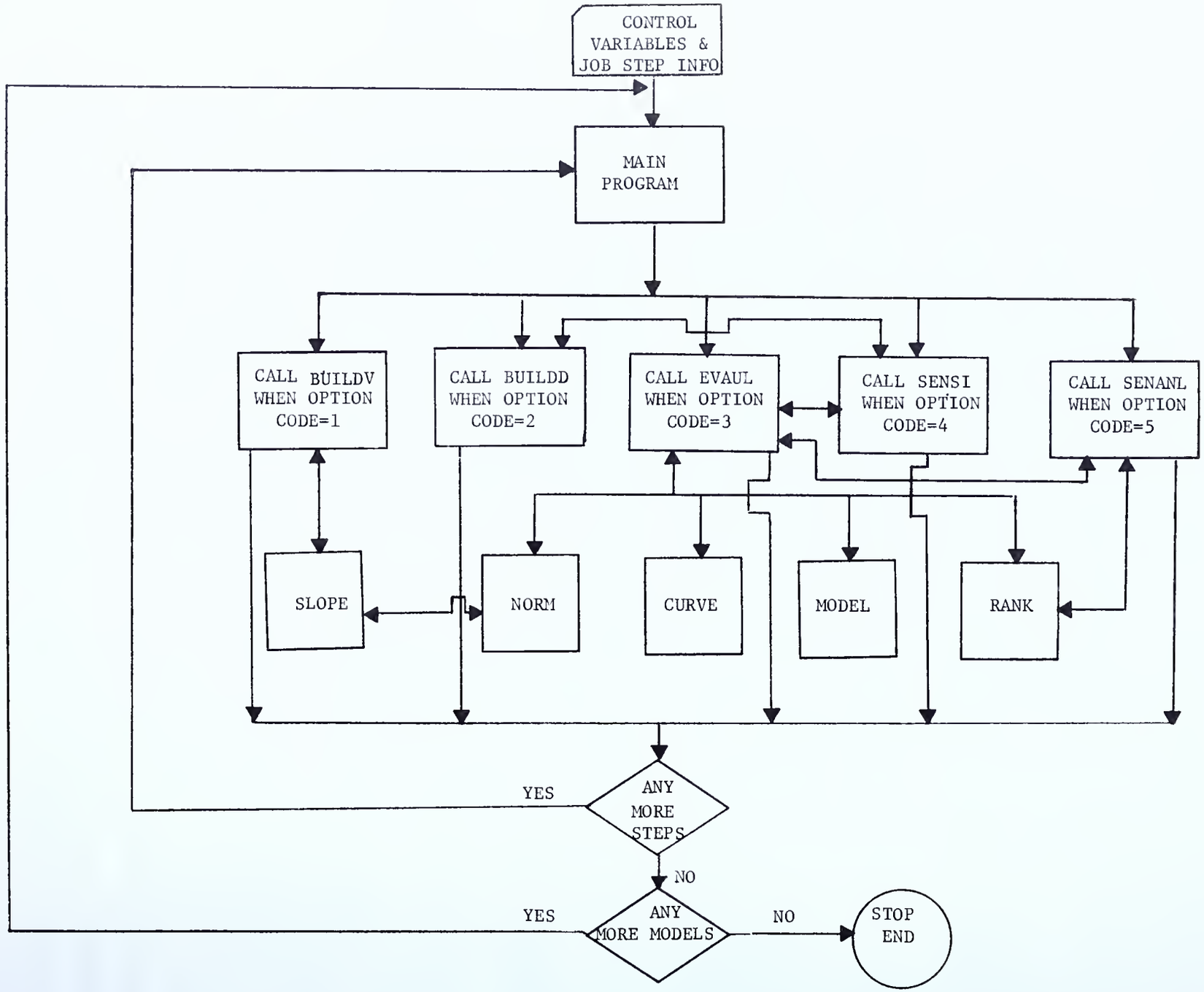

FIGURE B-1
STRUCTURED VALUE ANALYSIS PROGRAM JOB FLOW

Subroutine BUILDD

Subroutine BUILDD builds a Data Set. This subroutine reads in information about a project and calculates the Data Points for the project. If Variations of a Data Set are requested, the number and size of the Variations are read in and the Data Points for each variation are calculated. The Data Set for the original project is printed out and, if requested, the Data Set and its Variations are stored on a file. Control then reverts to the main program.

Subroutine EVAUL

Subroutine EVAUL evaluates a Data Set to determine its Structured Value. When EVAUL appears in the job sequence, it must immediately follow the BUILDD step which sets up the Data Set to be evaluated.

Subroutine EVAUL first calls subroutine CURVE to determine the Value Point associated with each Data Point of a Data Set and associated with each Data Point of each Variation of a Data Set. If any Data Point has to be normalized during the process, subroutine NORM is called. Then subroutine MODEL is called to determine the Structured Value of the Data Set and of each Variation. After the last of the Candidate Sets is evaluated, subroutine RANK is called to rank-order the Candidate Sets according to a number of criteria.

Printed output consists of the Data Point and the Value Point of the Data Set. Also, the Structured Value of the Data Set and each Variation is printed out. The rank-ordered Data Sets are then printed out. In addition, cards are punched out for input to the Dynamic Programming Routine discussed in Appendix C.

Control then reverts to the main program.

Subroutine SENANL

Subroutine SENANL performs a sensitivity analysis by varying the Data Point of one parameter for each of the Candidate Sets, by calculating the new Structured Value, and by rank-ordering the results. This sensitivity analysis is performed for each parameter. Subroutine SENANL calls subroutines EVAUL and RANK during the analysis.

The output consists of the rank-ordered Candidate Sets. Control is then returned to the main program.

Subroutine SENSI

Subroutine SENSI performs a sensitivity analysis on the parameters themselves. One at a time, the Data Point of each parameter is varied from a base value by an equivalent amount and the Structured Value determined. The parameters are then rank-ordered by their effect on the Structured Value.

The base value for each parameter in the analysis is determined by the user. Depending on the option selected, the base values are either read in or the midpoint of each Parameter Measurement Scale is used.

Output consists of the rank-ordered parameters. Control then reverts to the main program.

INPUT DATA DESCRIPTION AND FORMAT

The input data required to operate the program is described below.

Input for the Main Program

Card 1 - Control Variables

All data must be right justified. The format is (6I2).

Column	Variable	Description
1-2	NP	Number of parameters in this model.
3-4	NTV	File number on which the Value Set is to be stored. If the Value Set is not to be stored, NTV=5.
5-6	NTD	File number on which the Candidate Sets are to be stored. If the Candidate Sets are not to be stored, NTD=5.
7-8	NTW	File number from which the Value Set is to be read. NTW=5 for card input.
9-10	NTI	File number from which the Candidate Sets are to be read. NTI=5 for card input.
11-12	MULT	Indicator for multiple runs using more than one model. MULT=1 if there is another model to be run. MULT=0 for the last model or for a single model.

Card 2 - Job Step Information

All data has to be right justified. The format is(I3,38I2).

Column	Variable	Description
1-3	ITSTP	The total number of steps to be processed.
4-5	IOPT(1)	The option code for step 1. The option codes are: 1 = build a Value Set (BUILDV) 2 = build a Data Set (BUILDD) 3 = evaluate a Data Set (EVAUL) 4 = sensitivity analysis (SENSI) 5 = sensitivity analysis (SENANL).

Column	Variable	Description
6-7	IOPT(2)	The option code for step 2.
.	.	.
.	.	.
.	.	.
.	IOPT(ITSTP)	The option code for step ITSTP.

An option code must be specified for every step. If more than one card is required to account for all the steps, the format for each additional card is identical to the above, except that the next step in the sequence is input in columns 1-3 instead of ITSTP. Thus, 38 steps can be accounted for on the first card and 39 on each of the following cards.

The following restrictions apply to the processing sequence:

(a) Option 1 (BUILDV) should occur only once for each model. It should be the first step in the sequence for the model. All steps to be processed for a model should then occur before option 1 is called again to build a second model, if so desired.

(b) Option 1 is not required if <u>only</u> option 2 is to be processed. Options 3-5 require that option 1 previously have been processed.

(c) When option 3 (EVAUL) appears in the job sequence, it must immediately follow option 2 (BUILDD) which sets up a Data Set to be evaluated.

(d) Option 5 (SENANL) should be processed only after options 2 and 3 have been processed for the last of the Candidate Sets. For example, if three Data Sets are to be built and evaluated, and sensitivity analysis SENANL is to be performed, the sequence of steps should be 1, 2, 3, 2, 3, 2, 3, 5.

Following this card, the data cards required for each step are input in the order in which the steps are processed.

Input for Subroutine BUILDV (Option 1)

If the Value Set is to be read from a file (NTW≠5), there are not any cards to be input for this step. If NTW=5, all the following cards are to be input.

Card 1 - Value Set Name

Column	Variable	Description
1-12	MOD	The name of the Value Set

Card 2 - Category Weights

Column	Variable	Description
1-2	NGP	The number of categories into which the Terms of the model have been separated. The number of categories is limited to ten. This data must be right justified.
3-9	GWTS(1)	The weight for the first category
10-16	GWTS(2)	The weight for the second category
.	.	.
.	.	.
.	.	.
66-72	GWTS(10)	The weight for the tenth category

Card 3 - Number of Terms and Factors

All data must be right justified. The format is (I4,10I2)

Column	Variable	Description
1-4	JF	The number of Factors in the model
5-6	NPG(1)	The number of Terms in the first category

Column	Variable	Description
7-8	NPG(2)	The number of Terms in the second category
.	.	.
.	.	.
.	.	.
23-24	NPG(10)	The number of Terms in the tenth category

Cards 4 and 5 - Value Set Data

Cards 4 and 5 are to be repeated for each parameter with the exception that card 5 is not used for any parameter for which NBK(I)=0 in columns 72-73 of card 4.

Card 4 - Value Set. The format is (2A4,9F7.0,2I2,F2.0)

Column	Variable	Description
1-8	PNAME(I)	The name of the ith parameter.
9-15	PMAX(I)	Maximum value of the Parameter Measurement Scale for the ith parameter.
16-22	PMIN(I)	Minimum value of the Parameter Measurement Scale for the ith parameter.
23-29	PMAXY(I)	The Value Point corresponding to PMAX(I).
30-36	PMINY(I)	The Value Point corresponding to PMIN(I).
37-43	PCURVE(I)	The code of the Value Function of the ith parameter. Table B-1 lists the codes and functions.
44-50	PSCALE(I)	The scale of measure for the ith parameter. Enter one of the following in column 50: 0 = linear scale 1 = logarithmic scale.
51-57	ACON(I)	The value of constant A for the ith parameter when using Value Functions 2, 4, 5, 6, 7, 8, 9, 16, 19 or 20. Leave blank for all others.

TABLE B-1

VALUE FUNCTIONS

CODE	FUNCTION
1	†
2	Y = X * * A
3	Y = M * X + B
4	Y = (1. - X) * * A
5	Y = 1. - (1. - X) * * A
6	Y = A * (1./A * * X - 1.) / (1. - A)
7	Y = (1. - A * * (1. - X)) / (1. - A)
8	Y = (A * * X - A) / (1. - A)
9	Y = (1. - A * * X) / (1. - A)
10	Y = SIN (1.5708 * X)
11	Y = 1. - SIN (1.5708 * X)
12	Y = COS (1.5708 * X)
13	Y = 1. - COS (1.5708 * X)
14	†
15	†
16	Y = A
17	†
18	†
19	Y = TANH (C * X * * A)
20	Y = 1. - TANH (C * X * * A)
21	$\begin{cases} Y = 0, \text{ for } X \neq 1 \\ Y = 1, \text{ for } X = 1 \end{cases}$

† If desired, user can input any functions for these codes in Subroutine CURVE.

Column	Variable	Description
58-64	C(I)	The value of constant C for the ith parameter when using Value Functions 19 and 20. Leave blank for all others.
65-71	WTS(I)	The weight for the ith parameter.
72-73	NBK(I)	Use for Value Function 3 only. If Value Function 3 of the ith parameter is piecewise linear, enter the number of breakpoints. If there are no breakpoints or if the Value Function is not type 3, leave blank. The data must be right justified.
74-75	NF(I)	Normalization Factor for the ith parameter. If PMAX(I)=1 and PMIN(I)=0, leave blank. Otherwise enter 1 in column 75 to indicate the Parameter Measurement Scale has to be normalized. If PSCALE(I)=1, then NF(I)=1.
76-77	PSLOP(I)	Must be left blank.

The range of the Parameter Measurement Scale (PMIN to PMAX) can be defined to include all feasible Data Points or it can be defined to include only a subset of the feasible Data Points. A subset can be used when the Value Function becomes a constant for all Data Points greater than PMAX or less than PMIN. When this occurs PMAX (PMIN) can be set equal to the first (last) Data Point for which the Value Function is constant. For example, if the Value Function equals 1 for all Data Points greater than or equal to 1, PMAX can be set to 1 even if it is possible to have data points greater than 1. Note that if PMAX≠1 and PMIN≠0, the normalization factor must be set to 1.

Card 5 - Breakpoint Data. If NBK(I)=0 in the previous card, this card is not used. The format is (6F7.0).

Column	Variable	Description
1-7	BKX(I,1)	Location on the Parameter Measurement Scale of the first breakpoint of the ith parameter.
8-14	BKY(I,1)	The Value Point corresponding to BKX(I,1).
15-21	BKX(I,2)	Location on the Parameter Measurement Scale of the second breakpoint of the ith parameter.
22-28	BKY(I,2)	The Value Point corresponding to BKX(I,2).
29-35	BKX(I,3)	Location on the Parameter Measurement Scale of the third breakpoint of the ith parameter.
36-42	BKY(I,3)	The Value Point corresponding to BKX(I,3).

Input for Subroutine BUILDD (Option 2)

If the Data Set is to be read from a file (NTI≠5), there are no cards to be input for this step. If NTI=5, input the following cards.

Card 1 is input only one time. It must be input with the first Data Set. All other cards are input for each Data Set at the appropriate step.

Card 1 - Number of Data Sets

The format is I5.

Column	Variable	Description
1-5	NPROJ	The total number of Data Sets in the Candidate Set. This data must be right justified.

Card 2 - Data Set Data

The format is (2I5,11A4)

Column	Variable	Description
1-5	LR	The identification number of the Data Set for which data is being entered. The allowable identification numbers are 1 to NPROJ. Each number can be used once and only once. This data must be right justified.

Column	Variable	Description
6-10	NV	The number of Variations for the Data Set. Count the original Data Set as one variation. This data must be right justified.
11-54	DID(I,LR)	The name of the Data Set.

Card 3 - Funding Data

The format is (F10.0, F5.0)

Column	Variable	Description
1-10	COST(LR)	The cost in millions of dollars of Data Set LR.
11-15	PCTC(LR)	The percentage to be used to determine the variations of Data Set LR. Each successive variation decreases by PCTC(LR) per cent of the original Data Set.

Cards 4 and 5 - Data to Build the Data Set

The data to be entered on cards 4 and 5 applies when the SVA program is being used to evaluate urban renewal projects. If the SVA program is used for purposes other than urban renewal, the data to be entered for these cards has to be user defined.

Card 4 - First Part of the Input. The format is (F10.0, 3F5.0, 2F10.0, 3F5.0, F10.0, 2F5.0).

Column	Variable	Description
1-10	Y(1)	Total number of acres.
11-15	Y(2)	Total number of buildings before the disaster.
16-20	Y(3)	Total number of buildings destroyed.
21-25	Y(4)	Total number of buildings damaged.
26-35	Y(5)	Total number of residential acres (dwelling).
36-45	Y(6)	Total number of residential acres (related uses).

Column	Variable	Description
46-50	Y(7)	Total number of residential buildings.
51-55	Y(8)	Total number of residential buildings destroyed.
56-60	Y(9)	Total number of residential buildings damaged.
61-70	Y(10)	Total nonresidential acreage.
71-75	Y(11)	Total number of non-residential buildings.
76-80	Y(12)	Total number of non-residential buildings destroyed.

Card 5 - Second Part of Input. The format is (F5.0, F10.0, 8F5.0).

Column	Variable	Description
1-5	Y(13)	Total number of non-residential buildings damaged.
6-15	Y(14)	Total vacant or unimproved acreage.
16-20	Y(15)	Total number of dwelling units before the flood.
21-25	Y(16)	Number of unusable, but reparable non-minority dwelling units after the flood.
26-30	Y(17)	Number of unusable, but reparable minority dwelling units after the flood.
31-35	Y(18)	Usable non-minority occupied dwelling units after the flood.
36-40	Y(19)	Usable minority occupied dwelling units after the flood.
41-45	Y(20)	Total number of families remaining.
46-50	Y(21)	Total number of non-minority families remaining.
51-55	Y(22)	Total number of minority families remaining.

Input for Subroutine EVAUL (Option 3)

The EVAUL job step requires no input data, however, as has been stated, this job step must immediately follow the job step for Option 2 (BUILDD) in the job sequence.

Input for SENSI (Option 4)

Card 1 - Number of Sensitivity Analyses

The format is (I2, 10F7.0).

Column	Variable	Description
1-2	NV	Number of sensitivity analyses to be performed (varying the parameters by +PCT(NV) and -PCT(NV) counts as one analysis). There is a limit of 10. This data must be right justified.
3-9	PCT(1)	Positive percentage for the first variation.
10-16	PCT(2)	Positive percentage for the second variation.
.	.	.
.	.	.
.	.	.
66-72	PCT(10)	Positive percentage for the tenth variation.

Card 2 - Control Variables

All data must be right justified. The format is (3I2).

Column	Variable	Description
1-2	MID	The indicator for selecting the Data Points to be used as the base value in the sensitivity analysis. If MID=1, the midpoint of the Parameter Measurement Scale for each parameter is used. If MID=0, the data points are read in.

Column	Variable	Description
3-4	IPRINT	Printout indicator. If IPRINT=0, only the rank-ordered parameters are printed out. If IPRINT=1, the percentage variations in the Structured Value as well as the rank-ordered parameters are printed out.

Cards 3 and 4 - Data Points for Sensitivity Analysis SENSI

These two cards are used only if MID=0.

Card 3 - Data Set Name. The format is (2I5,11A4).

Column	Variable	Description
1-5	Dummy	Input a 1 in column 5.
6-10	Dummy	Input a 1 in column 10.
11-54	DID(J,K)	Data Set name for the kth data set, can be left blank if desired.

Card 4 - Data Points. The format is (10F7.0).

Column	Variable	Description
1-7	D(1)	Data Point to be used as the base value for Parameter 1.
8-14	D(2)	Data Point to be used as the base value for Parameter 2.
.	.	.
.	.	.
.	.	.
64-70	D(10)	Data Point to be used as the base value for Parameter 10.

This card is repeated until all the parameters have been given a base value.

Input for Subroutine SENANL (Option 5)

Card 1, Number of Variations.

Column	Variable	Description
1-2	NV	Number of sensitivity analyses to be performed. Varying a parameter by +PCS(NV) and -PCS(NV) counts as one analysis. There is a limit of 5. The data must be right justified.
3-9	PCS(1)	Positive percentage for the first analysis.
10-16	PCS(2)	Positive percentage for the second analysis.
.	.	.
.	.	.
.	.	.
31-37	PCS(5)	Positive percentage for the fifth analysis.

SAMPLE INPUT

This section illustrates how to prepare the input for the SVA program. A sample model is described and three sample projects are formulated.

Sample Model

A simple three area urban renewal program will be used as the sample. The sample model consists of 18 parameters. There are sixteen terms and two factors. The sixteen terms are grouped into seven categories and the seven categories contain 3, 1, 2, 2, 3, 2 and 3 parameters respectively.

Table B-2 presents the Value Set data for the model. Since the Value Function is type 3, constants A and C do not apply.

TABLE B-2
VALUE SET DATA

Parameter No.	Parameter Name	Term or Factor	Category	Category Weight	Parameter Weight	PMAX	PMIN	PMAXY	PMINY	PCURVE	PSCALE	ACON and C	NBK	NF	BKX1	BKY1	BKX2	BKY2	BKX3	BKY3
1	DESTROY	TERM	1	14.6	26	1	0	0	0	3	0	-	3	0	0.05	1.0	0.5	0.5	0.75	0
2	DEMOLISH	TERM	1	14.6	20	1	0	0	1.0	3	0	-	2	0	0.5	0.5	0.75	0		
3	REPARABL	TERM	1	14.6	54	1	0	1.0	0	3	0	-	2	0	0.5	0.9	0.75	0.99		
4	USABLE/D	TERM	2	18.6	100	1	0	1.0	0	3	0	-	2	0	0.5	0.9	0.75	0.99		
5	NRESDEST	TERM	3	9.6	34	1	0	0	0	3	0	-	3	0	0.05	1.0	0.5	0.5	0.75	0
6	NRES DAM	TERM	3	9.6	66	1	0	1.0	0	3	0	-	2	0	0.5	0.5	0.75	0.99		
7	ST HOUSE	TERM	4	20.8	23.6	1	0	0	1.0	3	0	-	1	0	0.9	0.9				
8	LT HOUSE	TERM	4	20.8	76.4	1	0	1.0	0	3	0	-	0	0						
9	MINORITY	TERM	5	12.0	25	1	0	1.0	0	3	0	-	1	0	0.1	1.0				
10	MIN REPB	TERM	5	12.0	70	1	0	1.0	0	3	0	-	1	0	0.1	1.0				
11	MIN USBL	TERM	5	12.0	5	1	0	0	0	3	0	-	2	0	0.1	1.0	0.2	1.0		
12	MAG DEST	TERM	6	13.2	54	1	0	1.0	0	3	0	-	3	0	0.2	0.2	0.5	0.6	0.8	0.9
13	DEML/DAM	TERM	6	13.2	46	1	0	0	1.0	3	0	-	1	0	0.5	0.25				
14	DENSITY	TERM	7	11.2	25	99	0	1.0	0	3	0	-	2	1	5.0	0	10.0	1.0		
15	RES ACRE	TERM	7	11.2	48	1	0	1.0	0	3	0	-	2	0	0.15	0	0.4	1.0		
16	NRES ACR	TERM	7	11.2	27	1	0	0	1.0	3	0	-	0	0						
17	UNDAMAG	FACTOR	-	100	100	1	0	0	1.0	3	0	-	0	0						
18	VACANT	FACTOR	-	100	100	1	0	0	1.0	3	0	-	2	0	0.25	0.5	0.5	0.25		

Sample Projects

There are to be three projects A, B and C. The Data Set information is presented in Table B-3.

Sensitivity Analysis

Both sensitivity analysis are to be run. There will be one analysis for each at ± 10%. The midpoint of the Parameter Measurement Scale will be used as the base for SENSI.

Input Data

The Value Set and the Data Set are to be read from cards and are not to be stored. Figure B-2 presents the input data for this problem. The data are arranged in the order in which they are to be input. The comment cards and blank cards are not to be part of the input.

SAMPLE OUTPUT

This section describes the output produced by the SVA program. The output from the sample model discussed in the previous section will be used for illustration.

Value Set

Figures B-3 and B-4 show the Value Set data. These output tables are produced by subroutine BUILDV.

Most of Figure B-3 is self-explanatory, however, there are some items that require comment.

XMAX and XMIN represent the range of the Parameter Measurement Scale. DENSITY is the only parameter whose range is not between zero and one, so it is the only parameter which has to be normalized (NORMALIZATION FACTOR = 1).

C-CONSTANT and A-CONSTANT refer to the constants for the curves (Value Functions) input to subroutine BUILDV on card 4. Since these

TABLE B-3
DATA SET INFORMATION

PROJECT	Cost (Millions)	Number of Variations	PCTC	Y1	Y2	Y3	Y4	Y5	Y6	Y7	Y8	Y9	Y10	Y11	Y12	Y13	Y14	Y15	Y16	Y17	Y18	Y19	Y20	Y21	Y22
Area A	44.22	3	10	983.7	3664	70	3105	441.2	0	3629	70	3070	77.5	35	0	35	244.7	3629	255	13	2704	142	2246	2134	112
Area B	14.57	2	20	983.7	3664	70	1570	441.2	0	1815	70	1535	77.5	35	0	35	244.7	3629	255	13	2704	142	1123	1067	56
Area C	34.21	3	9	983.7	3664	470	2900	441.2	0	3629	470	3070	77.5	35	0	35	244.7	3629	255	13	2704	142	1123	1067	56

IBM

FORTRAN Coding Form

GX28-7327-6 U/M 050**
Printed in U.S.A

PROGRAM: STRUCTURED VALUE ANALYSIS
PROGRAMMER:
DATE:
PUNCHING INSTRUCTIONS: GRAPHIC / PUNCH
PAGE 1 OF 6
CARD ELECTRIC NUMBER

COMM.	STATEMENT NUMBER	CONT.	FORTRAN STATEMENT	IDENTIFICATION SEQUENCE
C			MAIN PRØGRAM INPUT DATA	
C			CARD 1, CØNTRØL VARIABLES	
1	8 5	5	5 5 0	
C			CARD 2, JØB STEP INFØRMATIØN	
	9 1		2 3 2 3 2 3 4 5	
C			STEP 1, BUILDV	
C			CARD 1, VALUE SET NAME	
U	RBN		RENEWAL	
C			CARD 2, CATEGØRY WEIGHTS	
	7	1	4.6 18.6 9.6 20.8 12.0 13.2 11.2	
C			CARD 3, NUMBER ØF TERMS AND FACTØRS	
	2	3	1 2 2 3 2 3	

*A standard card form, IBM electro 888157, is available for punching statements from this form

**Number of forms per pad may vary slightly

FIGURE B-2
INPUT DATA FOR SAMPLE MODEL

IBM

FORTRAN Coding Form

GX28-7327-6 U/M 050
Printed in U.S.A.

PROGRAM: SVA

PROGRAMMER:

DATE:

PUNCHING INSTRUCTIONS: GRAPHIC / PUNCH

CARD NUMBER: 2 6

COMM	STATEMENT NUMBER	CONT	FORTRAN STATEMENT							
C			CARDS 4 AND 5, VALUE SET DATA							
			DESTROY 1. 0 0 3 0 26							30
			0.05 1.0 0.5 0.5 0.75 0							
			DEMOLISH 1. 0 0 1. 3 0 20							20
			0.5 0.5 0.75 0							
			REPAIRABL 1. 0 1. 0 3 0 54							20
			0.5 0.9 0.75 0.99							
			USABLE 1. 0 1. 0 3 0 100							20
			0.5 0.9 0.75 0.99							
			NRESDEST 1. 0 0 0 3 0 34							30
			0.05 1.0 0.5 0.5 0.75 0							
			NRESDAM 1. 0 1. 0 3 0 66							20
			0.5 0.5 0.75 0.99							
			ST HOUSE 1. 0 0 1. 3 0 23.6							10
			0.9 0.9							
			LT HOUSE 1. 0 1. 0 3 0 16.4							00
			MINORITY 1. 0 1. 0 3 0 25							10
			0.1 1.0							
			MIN REPA 1. 0 1. 0 3 0 70							10
			0.1 1.0							
			MIN USBL 1. 0 0 0 3 0 5							20
			0.1 1.0 0.2 1.0							

*A standard card form, IBM part number 888127, is available for punching statements from this form.

**Number of forms required may vary slightly.

FIGURE B-2 (CONTINUED)
INPUT DATA FOR SAMPLE MODEL

IBM

FORTRAN Coding Form

GX28-7327-6 U/M 050**
Printed in U.S.A.

PROGRAM: SVA
PROGRAMMER:
DATE:
PUNCHING INSTRUCTIONS: GRAPHIC / PUNCH
PAGE 3 OF 6
CARD ELECTRO NUMBER*

COMM.	STATEMENT NUMBER	CONT.	FORTRAN STATEMENT	IDENTIFICATION SEQUENCE
C			CARDS 4 AND 5 CØNTINUED	
MAG	DEST		1. 0 1. 0 3 0 54	3 0
	0.2		0.2 0.5 0.6 0.8 0.9	
DEML/	DAM		1. 0 0 1. 3 0 46	1 0
	0.5		0.25	
DENSITY			99. 0 1. 0 3 0 25	2 1
	.5.0		0 10.0 1.0	
RES	ACRE		1. 0 1. 0 3 0 48	2 0
	0.15		0 0.4 1.0	
NRES	ACR		1. 0 0 1. 3 0 27	0 0
UNDAMAG			1. 0 0 1. 3 0 100	0 0
VACANT			1. 0 0 1. 3 0 100	2 0
	0.25		0.5 0.5 0.25	
C			STEP 2, BUILDD	
C			CARD 1, NUMBER ØF DATA SETS	
	3			
C			CARD 2, DATA SET DATA	
	1		3 PRØJECT A	

*A standard card form, IBM electro 888157, is available for punching statements from this form

**Number of forms per pad may vary slightly

FIGURE B-2 (CONTINUED)
INPUT DATA FOR SAMPLE MODEL

IBM FORTRAN Coding Form

GX28-7327-6 U/M 050**
Printed in U.S.A.

PROGRAM: SVA
PROGRAMMER:
DATE:
PUNCHING INSTRUCTIONS: GRAPHIC / PUNCH
PAGE 4 OF 6

```
C          CARD 3, FUNDING DATA

      44.22      10

C          CARDS 4 AND 5, DATA TØ BUILD DATA SET
      983.7 3664      70 3105      441.2         0 3629      70 3070      77.5  35      0
   35         244.7 3629  255      13 2704  142 2246 2134  112

C          STEP 3, EVAUL
C          THERE IS NØ INPUT REQUIRED
C          STEP 4, BUILDD
C          CARD 1, NUMBER ØF DATA SETS IS NØT INPUT A SECOND TIME
C          CARD 2, DATA SET DATA

    2       2 PRØJECT B

C          CARD 3, FUNDING DATA

      14.57      20

C          CARDS 4 AND 5, DATA TØ BUILD DATA SET

      983.7 3664      70 1570      441.2         0 1815      70 1535      77.5  35      0
   35         244.7 3629  255      13 2704  142 1123 1067   56
```

FIGURE B 2 (CONTINUED)
INPUT DATA FOR SAMPLE MODEL

IBM

FORTRAN Coding Form

GX28-7327-6 U/M 050**
Printed in U.S.A

PROGRAM: SVA
PROGRAMMER:
DATE:
PUNCHING INSTRUCTIONS: GRAPHIC / PUNCH

CARD ELECTRO NUMBER*

COMM.	STATEMENT NUMBER	CONT.	FORTRAN STATEMENT	IDENTIFICATION SEQUENCE
C			STEP 5, EVAUL	
C			THERE IS NØ INPUT DATA	
C			STEP 6, BUILDD	
C			CARD 1, NUMBER ØF DATA SETS IS NØT INPUT	
C			CARD 2, DATA SET DATA	
	3		3 PRØJECT C	
C			CARD 3, FUNDING DATA	
		3	4.21 9	
C			CARDS 4 AND 5, DATA TØ BUILD DATA SET	
		4	3.7 3664 470 2900 441.2 0 3629 470 3070 77.5 35 0	
	35		244.7 3629 255 13 2704 142 1123 1067 56	
C			STEP 7, EVAUL	
C			THERE IS NØ INPUT DATA	
C			STEP 8, SENSI	
C			CARD 1, NUMBER ØF SENSITIVITY ANALYSES	
	1		10	

*A standard card form, IBM electro 888157, is available for punching statements from this form

**Number of forms per pad may vary slightly

FIGURE B-2 (CONTINUED)
INPUT DATA FOR SAMPLE MODEL

IBM FORTRAN Coding Form

GX28-7327-6 U/M 050**
Printed in U.S.A.

PROGRAM SVA | PROGRAMMER | DATE | PUNCHING INSTRUCTIONS | GRAPHIC | PUNCH | PAGE 6 6 | CARD ELECTRIC NUMBER*

```
C     CARD 2, CØNTRØL VARIABLES

  1 1

C     CARDS 3 AND 4 ARE NØT USED SINCE MID = 1
C     STEP 9, SENANL
C     CARD 1, NUMBER ØF VARIATIØNS

  1     10

C     END ØF INPUT
```

FIGURE B-2 (CONCLUDED)
INPUT DATA FOR SAMPLE MODEL

PARAMETERS CONSIDERED IN THE MODEL--URBN RENEWAL PAGE 1

NAME	X-MAX	X-MIN	PARAMETER WEIGHT	CATEGORY WEIGHT	CURVE NUMBER	SCALE	NO. OF BRK.PT.	SLOPE	NORM. FACTOR	C-CONSTANT	A-CONSTANT
DESTROY	1.000	0.0	0.2600	0.1460	3.	LINR	3	20.000	0	0.0	0.0
DEMOLISH	1.000	0.0	0.2000	0.1460	3.	LINR	2	-1.000	0	0.0	0.0
REPARABL	1.000	0.0	0.5400	0.1460	3.	LINR	2	1.800	0	0.0	0.0
USABLE/D	1.000	0.0	1.0000	0.1860	3.	LINR	2	1.800	0	0.0	0.0
NRESDEST	1.000	0.0	0.3400	0.0960	3.	LINR	3	20.000	0	0.0	0.0
NRES DAM	1.000	0.0	0.6600	0.0960	3.	LINR	2	1.000	0	0.0	0.0
ST HOUSE	1.000	0.0	0.2360	0.2080	3.	LINR	1	-0.111	0	0.0	0.0
LT HOUSE	1.000	0.0	0.7640	0.2080	3.	LINR	0	1.000	0	0.0	0.0
MINORITY	1.000	0.0	0.2500	0.1200	3.	LINR	1	10.000	0	0.0	0.0
MIN RFPB	1.000	0.0	0.7000	0.1200	3.	LINR	1	10.000	0	0.0	0.0
MIN USBL	1.000	0.0	0.0500	0.1200	3.	LINR	2	10.000	0	0.0	0.0
MAG DEST	1.000	0.0	0.5400	0.1320	3.	LINR	3	1.000	0	0.0	0.0
DEML/DAM	1.000	0.0	0.4600	0.1320	3.	LINR	1	-1.500	0	0.0	0.0
DENSITY	99.000	0.0	0.2500	0.1120	3.	LINR	2	0.0	1	0.0	0.0
RES ACRE	1.000	0.0	0.4800	0.1120	3.	LINR	2	0.0	0	0.0	0.0
NRES ACR	1.000	0.0	0.2700	0.1120	3.	LINR	0	-1.000	0	0.0	0.0
UNDAMAG	1.000	0.0	1.0000	1.0000	3.	LINR	0	-1.000	0	0.0	0.0
VACANT	1.000	0.0	1.0000	1.0000	3.	LINR	2	-2.000	0	0.0	0.0

FIGURE B-3
VALUE SET DATA

SLOPE ON SEGMENT FOLLOWING EACH BREAKPOINT

NUMBER	PARAMETER	NBK	BKX	BKY	BKSLOPE
1	DESTROY	3	0.05	1.00	-1.1111
			0.50	0.50	-2.0000
			0.75	0.0	0.0
2	DEMOLISH	2	0.50	0.50	-2.0000
			0.75	0.0	0.0
3	REPARABL	2	0.50	0.90	0.3600
			0.75	0.99	0.0400
4	USABLE/O	2	0.50	0.90	0.3600
			0.75	0.99	0.0400
5	NRESDEST	3	0.05	1.00	-1.1111
			0.50	0.50	-2.0000
			0.75	0.0	0.0
6	NRES DAM	2	0.50	0.50	1.9600
			0.75	0.99	0.0400
7	ST HOUSE	1	0.90	0.90	-9.0000
8	LT HOUSE	0			
9	MINORITY	1	0.10	1.00	0.0
10	MIN REPB	1	0.10	1.00	0.0
11	MIN USBL	2	0.10	1.00	0.0
			0.20	1.00	-1.2500
12	MAG DEST	3	0.20	0.20	1.3333
			0.50	0.60	1.0000
			0.80	0.90	0.5000
13	DEML/DAM	1	0.50	0.25	-0.5000
14	DENSITY	2	5.00	0.0	19.8000
			10.00	1.00	0.0
15	RES ACRE	2	0.15	0.0	4.0000
			0.40	1.00	0.0
16	NRES ACR	0			
17	UNDAMAG	0			
18	VACANT	2	0.25	0.50	-1.0000
			0.50	0.25	-0.5000

FIGURE B-4
SLOPE AND BREAKPOINT DATA

constants do not apply to curve type 3, zeros are printed out.

The SLOPE applies to type 3 curves only. For all other curves, a zero will be printed out.

If the type 3 curve does not have breakpoints, SLOPE gives the slope along the entire curve. If the curve has breakpoints, SLOPE gives the slope of the curve up to the first breakpoint. The slope along the rest of the curve is printed in Figure B-4. In this figure, BKSLOPE gives the slope of the curve along each of the segments after the first.

If the Parameter Measurement Scale requires normalization, SLOPE and BKSLOPE give the slope of the normalized curve. For example, DENSITY is the only function that requires normalization. Along its second segment ([5,0], [10,1]), the unnormalized slope would be 0.2. However, when normalized, the slope becomes 19.8 and this is the value printed out.

In Figure B-4 NBK is the number of breakpoints. BKX and BKY are the location of the breakpoint on the Parameter Measurement Scale and the Value Point of the breakpoint, respectively. BKSLOPE is the slope along each segment after the first breakpoint.

Data Set

Figures B-5 and B-6 present the Data Set information. There is one set of these tables for each project. The example shows the Data Set information for AREA A (project number 1).

Figure B-5 describes the project, the number of variations and the size of the variations. The input data used to determine the Data Points is printed out for verification. The parameter, its Data Point and Value Point are also printed out.

The column RESET DATA POINT DATA EXCEEDS LIMIT requires explanation. When the Parameter Measurement Scale has not been defined over the

PROJECT NUMBER 1
AREA A

THERE ARE 3 VARIATIONS FOR THIS PROJECT. THE BUDGET RANGE IS 80.0% TO 100.0%, IN STEPS OF 10.0%.

INPUT DATA(FOR 100% FUNDING):

TOTAL ACRES	=	983.700
TOTAL BLDG. BEFORE DISASTER	=	3664.000
TOTAL BLDG. DESTROYED	=	70.000
TOTAL BLDG. DAMAGED	=	3105.000
RES. ACREAGE (DWELLING)	=	441.200
RES. ACREAGE (RELATED)	=	0.0
TOTAL RES. BLDG.	=	3629.000
TOTAL RES. BLDG. DESTROYED	=	70.000
TOTAL RES. BLDG. DAMAGED	=	3070.000
NONRES. ACREAGE	=	77.500
TOTAL NONRES. BLDG.	=	35.000
TOTAL NONRES. BLDG. DESTROYED	=	0.0
TOTAL NONRES. BLDG. DAMAGED	=	35.000
VACANT OR UNIMPROVED ACREAGE	=	244.700
DWELLING UNITS BEFORE FLOOD	=	3629.000
UNUSABLE BUT REPARBL(NON-MIN)	=	255.000
UNUSABLE BUT REPARBL(MINORTY)	=	13.000
USABLE(NON-MINORITY)	=	2704.000
USABLE(MINORITY)	=	142.000
TOTAL FAMILIES REMAINING	=	2246.000
TOTAL NON-MIN FAMILIES	=	2134.000
TOTAL MINORITY FAMILIES	=	112.000
PROJECT COST	=	$ 44.220 MILLION.

DATA POINTS AND ASSOCIATED VALUE POINTS

NUMBER	PARAMETER	DATA POINT	RESET DATA POINT DATA EXCEEDS LIMIT	VALUE POINT
1	DESTROY	0.0193		0.3858
2	DEMOLISH	0.1226		0.8774
3	REPARABL	0.0738		0.1329
4	USABLE/D	0.6495		0.9538
5	NRESDEST	0.0		0.0
6	NRES DAM	1.0000		1.0000
7	ST HOUSE	1.2671	1.0000	0.0000
8	LT HOUSE	0.6189		0.6189
9	MINORITY	0.0499		0.4987
10	MIN REPB	0.0485		0.4851
11	MIN USBL	0.0499		0.4989
12	MAG DEST	0.8665		0.9333
13	DEML/DAM	0.1450		0.7826
14	DENSITY	8.2253		0.6451
15	RES ACRE	0.4485		1.0000
16	NRES ACR	0.0788		0.9212
17	UNDAMAG	0.1335		0.8665
18	VACANT	0.2488		0.5025

FIGURE B-5
DATA SET

STRUCTURED VALUE OF THE DATA SET AND ITS VARIATIONS
PROJECT NUMBER 1
AREA A

VARIATION	PERCENTAGE	COST (MILLIONS)	STRUCTURED VALUE
1	100.0	$ 44.220	0.2883772
2	90.0	$ 39.798	0.2900175
3	80.0	$ 35.376	0.2920744

FIGURE B-6
C[illegible]D STRUCTURED VALUE OF EACH VARIATION

entire feasible range of Data Points (see Section on card 4 input to subroutine BUILDV), Data Points which fall outside the defined range are reset to the appropriate range limit since this will not affect the Value Point calculation. (However, the original Data Point is saved for use in sensitivity analysis SENANL.)

Figure B-6 gives the cost and the Structured Value for the Data Set (project) and for each of its Variations.

Project Rankings

After the Structured Value has been calculated for each Data Set, the Data Sets are rank-ordered by three criteria. The Variations are not used in the rank ordering.

The three criteria used are the Structured Value, the Structured Value to Project Cost ratio, and the Structured Value to the Cost per Family Unit ratio.

Figure B-7 presents the results.

Sensitivity Analysis SENANL

In Sensitivity Analysis SENANL, each Data Point is varied one at a time by a given percentage (plus and minus) for all the Data Sets and the new Structured Value is determined. The Data Sets are then rank-ordered using the same three criteria discussed above for project ranking.

Figures B-8, B-9 and B-10 give the rank-ordering when the Data Point of the first parameter is varied by $\pm$ 10%. There are similar tables for each of the other parameters.

Sensitivity Analysis SENSI

For a given Data Set, Sensitivity Analysis SENSI separately varies each parameter and calculates the new Structured Value. The parameters are then rank-ordered according to their effect on the Structured Value.

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PROJECT RANKINGS ACCORDING TO VALUE

PROJECT	RANK	VALUE
3 AREA C	1	0.3035796
1 AREA A	2	0.2883772
2 AREA B	3	0.1356052

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PROJECT RANKINGS ACCORDING TO VALUE/COST RATIO

PROJECT	RANK	VALUE	COST(MILLIONS)	VALUE/COST
2 AREA B	1	0.1356052	14.570	0.0093071
3 AREA C	2	0.3035796	34.210	0.0088740
1 AREA A	3	0.2883772	44.220	0.0065214

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PROJECT RANKINGS ACCORDING TO VALUE/(COST PER FAMILY UNIT) RATIO

PROJECT	RANK	VALUE	COST(MILLIONS)	FAMILIES	VALUE/(COST PER FAMILY UNIT)
1 AREA A	1	0.2883772	44.220	2246.0	14.6471138
2 AREA B	2	0.1356052	14.570	1123.0	10.4519243
3 AREA C	3	0.3035796	34.210	1123.[illegible]	9.9655046

FIGURE B-7
RANK-ORDERED PROJECTS

PARAMETER 1 VARIES BY + 10.0%. SENSITIVITY ANALYSIS PAGE 12

PROJECT RANKINGS ACCORDING TO VALUE

PROJECT	RANK	VALUE	PERCENT CHANGE
3 AREA C	1	0.3033271	-0.083
1 AREA A	2	0.2890149	0.221
2 AREA B	3	0.1362637	0.486

PARAMETER 1 VARIES BY - 10.0%. SENSITIVITY ANALYSIS PAGE 13

PROJECT RANKINGS ACCORDING TO VALUE

PROJECT	RANK	VALUE	PERCENT CHANGE
3 AREA C	1	0.3038321	0.083
1 AREA A	2	0.2877396	-0.221
2 AREA B	3	0.1349466	-0.486

FIGURE B-8
SENSITIVITY ANALYSIS: PROJECTS RANK-ORDERED BY STRUCTURED VALUE

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SENSITIVITY ANALYSIS

PARAMETER 1 VARIES BY + 10.0%.

PROJECT RANKINGS ACCORDING TO VALUE/COST RATIO

PROJECT	RANK	VALUE	COST(MILLIONS)	VALUE/COST	PERCENT CHANGE
2 AREA B	1	0.1362637	14.570	0.0093523	0.486
3 AREA C	2	0.3035271	34.210	0.0088666	-0.083
1 AREA A	3	0.2890149	44.220	0.0065358	0.221

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SENSITIVITY ANALYSIS

PARAMETER 1 VARIES BY - 10.0%.

PROJECT RANKINGS ACCORDING TO VALUE/COST RATIO

PROJECT	RANK	VALUE	COST(MILLIONS)	VALUE/COST	PERCENT CHANGE
2 AREA B	1	0.1349466	14.570	0.0092619	-0.486
3 AREA C	2	0.3038321	34.210	0.0088814	0.083
1 AREA A	3	0.2877396	44.220	0.0065070	-0.221

FIGURE B-9
SENSITIVITY ANALYSIS: PROJECTS RANK-ORDERED BY STRUCTURED VALUE/COST RATIO

SENSITIVITY ANALYSIS

PARAMETER 1 VARIES BY + 10.0%.

PROJECT RANKINGS ACCORDING TO VALUE/(COST PER FAMILY UNIT) RATIO

PROJECT	RANK	VALUE	COST(MILLIONS)	FAMILIES	VALUE/(COST PER FAMILY UNIT)	PERCENT CHANGE
1 AREA A	1	0.2890149	44.220	2246.0	14.6794949	0.221
2 AREA B	2	0.1362637	14.570	1123.0	10.5026875	0.486
3 AREA C	3	0.3033271	34.210	1123.0	9.9572172	-0.083

SENSITIVITY ANALYSIS

PARAMETER 1 VARIES BY - 10.0%.

PROJECT RANKINGS ACCORDING TO VALUE/(COST PER FAMILY UNIT) RATIO

PROJECT	RANK	VALUE	COST(MILLIONS)	FAMILIES	VALUE/(COST PER FAMILY UNIT)	PERCENT CHANGE
1 AREA A	1	0.2877396	44.220	2246.0	14.6147261	-0.221
2 AREA B	2	0.1349466	14.570	1123.0	10.4011660	-0.486
3 AREA C	3	0.3038321	34.210	1123.0	9.9737921	0.083

FIGURE B-10
SENSITIVITY ANALYSIS: PROJECTS RANK-ORDERED BY STRUCTURE VALUE/COST PER FAMILY UNIT

Figures B-11 and B-12 present the result of the SENSI snsitivity analysis. Figure B-11 shows the base value for the analysis. Figure B-12 gives the rank-ordering.

In Figure B-12 NUMBER represents the parameter's identification number. ORDER shows the parameter's ranking. PCT.POS. gives the percentage by which the Structured Value changes when the parameter is varied by a positive percentage. PCT.NEG. gives the percentage by which the Structured Value changes when the parameter is varied by a negative percentage. DIFF.X100 represents the result when the Structured Value for the negative percentage variation is subtracted from the Structured Value for the positive percentage variation. This value is multiplied by one hundred.

PROGRAM LISTINGS

The listings for the Structured Value Analysis program are given in Figure B-13.

SENSITIVITY ANALYSIS OF PARAMETERS
BASE VALUE = 0.089791

DATA FOR BASE VALUE ARE :

1	DESTROY	0.500
2	DEMOLISH	0.500
3	REPARABL	0.500
4	USABLE/D	0.500
5	NRESDEST	0.500
6	NRES DAM	0.500
7	ST HOUSE	0.500
8	LT HOUSE	0.500
9	MINORITY	0.500
10	MIN REPB	0.500
11	MIN USBL	0.500
12	MAG DEST	0.500
13	DEML/DAM	0.500
14	DENSITY	49.500
15	RES ACRE	0.500
16	NRES ACR	0.500
17	UNDAMAG	0.500
18	VACANT	0.500

FIGURE B-11
BASE VALUES FOR PARAMETER DATA POINTS

SENSITIVITY ANALYSIS OF PARAMETERS PAGE 85

BASE VALUE = 0.089791

PERCENT VARIATION IS: 10.00

PARAMETER NAME	NUMBER	ORDER	PCT. POS.	PCT. NEG.	DIFF. X100
VACANT	18	1	-20.000015	39.999908	-5.387473
UNDAMAG	17	2	-20.000015	19.999954	-3.591650
USABLE/O	4	3	0.932126	-4.660830	0.502199
LT HOUSE	8	4	2.212223	-2.212290	0.397283
NRES OAM	6	5	1.728768	-0.882075	0.234431
REPARABL	3	6	0.395102	-1.975574	0.212866
MAG OEST	12	7	0.992268	-1.323112	0.207901
DEML/OAM	13	8	-0.422650	1.267949	-0.151801
DESTROY	1	9	-1.056923	0.587143	-0.147623
NRESDEST	5	10	-0.908760	0.504830	-0.126928
OEMOLISH	2	11	-0.813038	0.406453	-0.109500
NRES ACR	16	12	-0.420990	0.420924	-0.075597
MIN USBL	11	13	-0.104418	0.104418	-0.018752
ST HOUSE	7	14	-0.075940	0.075874	-0.013632
MINORITY	9	15	0.0	0.0	0.0
MIN REPB	10	16	0.0	0.0	0.0
DENSITY	14	17	0.0	0.0	0.0
RES ACRE	15	18	0.0	0.0	0.0

FIGURE B-12
RESULTS OF SENSITIVITY ANALYSIS SENSI

```
0001          COMMON PNAME(100,2),PMAX(100),PMIN(100),PCURVE(100),PSCALE(100),
             1NBK(100),BKX(100,3),BKY(100,3),BKSLOP(100,3),WTS(100),D(10,100),
             2OIO(11,100),PMAXY(100),PMINY(100),PSLOP(100),PRANGE(100),C(100),
             3MOO(3),M,NTV,KEE, NTD,NTW,NTI,NF(100),ACON(100),IPAGE,NP,COST(85),
             4VAL(10,85),PCOST(10,85),VAU(10,85),VLCS(10,85),DS(18,85),PCTC(85),
             5LR,NPROJ,NVAR(85),NCOUNT
0002          DIMENSION IOPT(301)
0003       15 READ(5,2) NP,NTV,NTD,NTW,NTI,MULT
0004        2 FORMAT(6I2)
0005          READ(5,3) ITSP,(IOPT(I),I=1,ITSP)
0006        3 FORMAT(I3,38I2)
0007          KEE = 1
0008          M = 1
0009          IPAGE=0
0010          DO 10 I=1, ITSP
0011          IT=IOPT(I)
0012          GO TO(20,30,40,100,50),IT
0013       20 CALL BUILOV
0014          GO TO 10
0015       30 CALL BUILDO(1)
0016          GO TO 10
0017       40 CALL EVAUL(EFF)
0018          GO TO 10
0019      100 CALL SENSI
0020          GO TO 10
0021       50 CALL SENANL
0022       10 CONTINUE
0023          IF(MULT.EQ.1)GO TO 15
0024          STOP
0025          END
```

FIGURE B-13
SVA PROGRAM LISTING

```
0001          SUBROUTINE BUILDV
0002          COMMON PNAME(100,2),PMAX(100),PMIN(100),PCURVE(100),PSCALE(100),
             1NBK(100),BKX(100,3),BKY(100,3),BKSLOP(100,3),WTS(100),D(10,100),
             2DID(11,100),PMAXY(100),PMINY(100),PSLOP(100),PRANGE(100),C(100),
             3MOD(3),M,NTV,KEE, NTD,NTW,NTI,NF(100),ACON(100),IPAGE,NP,COST(85),
             4VAL(10,85),PCOST(10,85),VAD(10,85),VLCS(10,85),DS(18,85),PCTC(85),
             5LR,NPROJ,NVAR(85),NCOUNT
0003          COMMON GWTS(11),NGP,NPG(10),JF
0004          DIMENSION SCALE(2)
0005          DATA SCALE /'LINR',' LOG'/
0006          IF(NTW .EQ.5) GO TO 500
0007          REWIND NTW
0008           READ(NTW,1) (MOD(I),I=1,3)
0009        1 FORMAT(3A4)
0010          DO 530 I=1,NP
0011          READ(NTW,111) (PNAME(I,J),J=1,2),PMAX(I),PMIN(I), WTS(I),PMAXY(I),
             1PMINY(I),PCURVE(I),PSCALE(I),PSLOP(I),C(I),ACON(I),NB,(BKX(I,K),BK
             2Y(I,K),BKSLOP(I,K),K=1,NB)
0012      111 FORMAT(2A4, 3F7.4,2F5.2,2F4.0,F10.4,2F7.3,I2,3(F11.3,F6.3,F11.5))
0013          NBK(I)=NB
0014      530 CONTINUE
0015           READ(NTW,8) NGP,(GWTS(LL),LL=1,NGP)
0016        8 FORMAT(I2,10F7.4)
0017           READ(NTW,9) JF,(NPG(LL),LL=1,NGP)
0018        9 FORMAT(I4,10I2)
0019          GO TO 502
0020      500 READ(5,1) (MOD(I),I=1,3)
0021          READ(5,800) NGP,(GWTS(L),L=1,NGP)
0022      800 FORMAT(I2,10F7.0)
0023          READ(5,9) JF,(NPG(LL),LL=1,NGP)
0024          IF(NTV .EQ. 5) GO TO 502
0025          WRITE(NTV,1) (MOD(I),I=1,3)
0026      502 IPC=0
0027          L = 1
0028          KL = 0
0029          KR = 0
0030          DO 20 I=1,NP
0031          IF(NTW .NE. 5) GO TO 501
0032          READ(5,  2) (PNAME(I,J),J=1,2),PMAX(I),PMIN(I),PMAXY(I),PMINY(I),
             1PCURVE(I),PSCALE(I), ACON(I),C(I),WTS(I),NBK(I),NF(I),PSLOP(I)
0033        2 FORMAT(2A4,9F7.0,2I2,F2.0)
0034      501 NB=NBK(I)
0035          IF(NTW .NE. 5) GO TO 30
0036          IF(PCURVE(I) .NE.3) GO TO 30
0037          IF(NB .EQ. 0) GO TO 25
0038          READ(5,3) (BKX(I,K),BKY(I,K),K=1,NB)
0039        3 FORMAT(7F7.0)
0040       25 CALL SLOPE(I)
0041       30 PRANGE(I)=PMAX(I)-PMIN(I)
0042          IF(PSCALE(I))  21,21,10
0043       10 IF(PMIN(I)) 15,15,21
0044       15 WRITE(6,7) (PNAME(I,J),J=1,2),PMIN(I),PSCALE(I)
0045        7 FORMAT(1H0 'ERROR FOR PARAMETER ',2A4, 'MIN AND SCALE= ',2F10.2)
0046       21 NS=PSCALE(I) + 1
```

FIGURE B-13 (CONTINUED)
SVA PROGRAM LISTING

```
0047              IF(IPC) 60,60,70
0048           60 IPAGE =IPAGE +1
0049              WRITE(6,102)  (MOD(J),J=1,3) ,IPAGE
0050          102 FORMAT(1H1 35X,'PARAMETERS  CONSIDERED  IN  THE  MODEL--',3A4,5X,
                 1'PAGE',I4///31X,'PARAMETER',2X,'CATEGORY',3X,'CURVE',14X,'NO. OF',
                 216X,'NORM.'/1X,'NAME',9X,'X-MAX',5X,'X-MIN',4X,'WEIGHT',4X,'WEIGHT
                 3',4X,'NUMBER',4X,'SCALE',4X,'BRK.PT.',4X,'SLOPE',6X,'FACTOR',4X,'C
                 4-CONSTANT',4X,'A-CONSTANT'/)
0051              LINE = 6
0052              IPC=1
0053           70 IF(LINE-56) 80,60,60
0054           80 IF(KR .EQ. 1) GO TO 81
0055              KL = KL+1
0056              IF(KL .LE. NPG(L)) GO TO 81
0057              KL = 1
0058              L = L+1
0059              IF(L .LE. NGP) GO TO 81
0060              L = 11
0061              KR = 1
0062              GWTS(L) = 1.0
0063           81 WRITE(6,101) (PNAME(I,J),J=1,2),PMAX(I),PMIN(I),WTS(I),GWTS(L),PCU
                 1RVE(I),SCALE(NS),NB,PSLOP(I),NF(I),C(I),ACON(I)
0064          101 FORMAT(1H0,2A4,2(3X,F7.3),2(3X,F7.4),4X,F4.0,7X,A4,6X,I2,4X,F10.3,
                 16X,I2,8X,F7.3,7X,F7.3)
0065              LINE=LINE+2
0066              IF(NTV.EQ.5 ) GO TO 20
0067              WRITE(NTV,111)(PNAME(I,J),J=1,2),PMAX(I),PMIN(I), WTS(I),PMAXY(I),
                 1PMINY(I),PCURVE(I),PSCALE(I),PSLOP(I),C(I),ACON(I),NB,(BKX(I,K),BK
                 2Y(I,K),BKSLOP(I,K),K=1,NB)
0068           20 CONTINUE
0069              IF(NTV .EQ. 5) GO TO 844
0070              WRITE(NTV,8) NGP,(GWTS(LL),LL=1,NGP)
0071              WRITE(NTV,9) JF,(NPG(LL),LL=1,NGP)
0072          844 IPC = 0
0073              DO 840 I = 1,NP
0074              NB = NBK(I)
0075              IF(IPC) 847,847,848
0076          847 IPAGE = IPAGE+1
0077              WRITE(6,845) IPAGE
0078          845 FORMAT(1H1,30X,'SLOPE ON SEGMENT FOLLOWING EACH BREAKPOINT',28X,'P
                 1AGE ',I3/)
0079              WRITE(6,839)
0080          839 FORMAT(1H ,'NUMBER',4X,'PARAMETER',4X,'NBK',4X,'BKX',4X,'BKY',9X,'
                 1BKSLOPE'/)
0081              LINE = 4
0082              IPC=1
0083          848 NBL = LINE+NB+1
0084              IF(NB .EQ. 0) NBL=NBL+1
0085              IF(NBL-57) 849,847,847
0086          849 IF(NB .EQ. 0) GO TO 842
0087              WRITE(6,841) I,(PNAME(I,J),J=1,2),NB     ,(BKX(I,K),BKY(I,K),BKSLOP
                 1(I,K),K=1,NB)
0088          841 FORMAT(3X,I3,6X,2A4,3X,I3,4X,F5.2,2X,F5.2,5X,F10.4/30X,F5.2,2X,F5.
                 12,5X,F10.4/30X,F5.2,2X,F5.2,5X,F10.4/)
```

FIGURE B-13 (CONTINUED)
SVA PROGRAM LISTING

```
0089          LINE = LINE+NB+1
0090          GO TO 840
0091      842 WRITE(6,843) I,(PNAME(I,J),J=1,2),K
0092      843 FORMAT(5X,I3,6X,2A4,3X,I3/)
0093          LINE = LINE+2
0094      840 CONTINUE
0095      100 RETURN
0096          END
```

FIGURE B-13 (CONTINUED)
SVA PROGRAM LISTING

```
0001          SUBROUTINE SLOPE(I)
0002          COMMON PNAME(100,2),PMAX(100),PMIN(100),PCURVE(100),PSCALE(100),
             1NBK(100),BKX(100,3),BKY(100,3),BKSLOP(100,3),WTS(100),D(10,100),
             2DIO(11,100),PMAXY(100),PMINY(100),PSLOP(100),PRANGE(100),C(100),
             3MOO(3),M,NTV,KEE, NTO,NTW,NTI,NF(100),ACON(100),IPAGE,NP,COST(85),
             4VAL(10,85),PCOST(10,85),VAU(10,85),VLCS(10,85),OS(18,85),PCTC(85),
             5LR,NPROJ,NVAR(85),NCOUNT
0003          DIMENSION V(3)
0004          L=NBK(I)
0005          IF(L .NE. 0) GO TO 10
0006          PSLOP(I) = PMAXY(I)-PMINY(I)
0007          GO TO 100
0008       10 DO 20 K=1,L
0009          CALL NORM(I, BKX(I, K), V(K))
0010       20 CONTINUE
0011          PSLOP(I)= (BKY(I,1) -PMINY(I) ) /(V(1) - 0.)
0012          GO TO (30, 40, 50), L
0013       30 BKSLOP(I,1) =( PMAXY(I) - BKY(I,1) ) /(1.-V(1))
0014          GO TO 100
0015       40 BKSLOP(I,1) =( BKY(I,2) -BKY(I,1)) /(V(2) -V(1))
0016          BKSLOP(I,2) =(PMAXY(I) -BKY(I,2)) /(1. -V(2))
0017          GO TO 100
0018       50 BKSLOP(I,1) =(BKY(I,2) -BKY(I,1))/(V(2)- V(1))
0019          BKSLOP(I,2) =(BKY(I,3) -BKY(I,2))/(V(3) -V(2))
0020          BKSLOP(I,3) =(PMAXY(I) -BKY(I,3))/(1.-V(3))
0021      100 RETURN
0022          END
```

FIGURE B-13 (CONTINUED)
SVA PROGRAM LISTING

```
0001          SUBROUTINE BUILDO (KEY)
0002          COMMON PRED(100,2),PMAX(100),PMI(100),PCOVE(100),PSCALE(100),
             1NGX(100),SKX(100,3),SKY(100,3),SKSUP(100,3),ATS(100),D(100),
             2DI(11,100),PMAXY(100),PMINY(100),SLOP(100),PRANGE(100),S(100),
             3MOD(3),Z,NTV,KEE,NTJ,NTW,NTI,NR(100),ACOST(100),IPAGE,NR,COST(85),
             4VAR(10,85),PCOST(10,85),VAR(10,85),VLCS(10,85),DS(10,85),PCTC(85),
             5LR,NPROJ,NVAR(85),NCOUNT
0003          COMMON/BT/XF(1),100)
0004          DIMENSION X(22),Y(22),B(10)
0005          IF(KEY .NE. 1) GO TO 27
0006          NCOUNT = 1
0007          READ(NTI,4) NPROJ
0008        4 FORMAT(I5)
0009          IF(NPROJ .EQ. 5) GO TO 45
0010          WRITE(NTO,41) NPROJ
0011       41 FORMAT(I5)
0012       45 G = 0
        C FOR SENSI,LR=1,NV=1
0013       27 READ(NTI,5) LR,NV, (DID(I,LR),I=1,11)
0014        5 FORMAT(2I5,11A4)
0015          NVAR(LR) = NV
0016          IF(KEY .EQ. 0) GO TO 12
0017          IF(NTI .NE. 5) GO TO 12
0018          READ(5,3) COST(LR),PCTC(LR)
0019        3 FORMAT(F10.0,F5.0)
0020          READ(5,2) (Y(I),I=1,22)
0021        2 FORMAT(F10.0,3F5.0,2F10.0,3F5.0,F10.0,2F5.0/F5.0,F10.0,3F5.0)
0022          DP = NV-1
0023          P = 100.-(DP*PCTC(LR))
0024          DP = 100.
0025          IPAGE = IPAGE+1
0026          WRITE(6,845) IPAGE
0027      845 FORMAT(1H1,100X,'PAGE ',I3)
0028          WRITE(6,17) LR,(DID(I,LR),I=1,11),NV,P,DP,PCTC(LR)
0029       17 FORMAT(1X,'PROJECT NUMBER',I4/1X,11A4///1X,'THERE ARE',I3,' VARIA
             1TIONS FOR THIS PROJECT. THE BUDGET RANGE IS',F6.1,'% TO',F6.1,'%,
             2IN STEPS OF',F6.1,'%.'//1X,'INPUT DATA(FOR 100% FUNDING):'/)
0030          DO 15 L =1,NV
0031          DELY = L-1
0032          DO 9 J = 1,22
0033          IF(J .NE. 3) GO TO 10
0034          X(3) = Y(3)
0035          GO TO 9
0036       10 IF(J .NE. 8) GO TO 11
0037          X(8) = Y(8)
0038          GO TO 9
0039       11 IF(J .NE. 12) GO TO 13
0040          X(12) = Y(12)
0041          GO TO 9
0042       13 X(J) = ((100.-(DELY*PCTC(LR)))/100.)*Y(J)
0043        9 CONTINUE
0044          XF(L,LR) = X(20)
0045          B(1) = X(8)/X(7)
0046          B(2) = (X(15)-(X(15)*X(8)/X(7))-X(16)-X(17)-X(18)-X(19))/X(15)
```

FIGURE B-13 (CONTINUED)
SVA PROGRAM LISTING

```
0047          B(3) = (X(16)+X(17))/X(15)
0048          B(4) = (X(18)+X(19)-X(15)+(X(15)*X(8)/X(7))+(X(15)*X(9)/X(7)))/X(1
             15)
0049          B(5) = X(12)/X(11)
0050          B(6) = X(13)/X(11)
0051          B(7) = (X(18)+X(19))/X(20)
0052          B(8) = X(20)/X(15)
0053          B(9) = X(22)/X(20)
0054          B(10) =X(17)/(X(16)+X(17))
0055          B(11) =X(19)/(X(18)+X(19))
0056          B(12) = (X(3)+X(4))/X(2)
0057          B(13) = (X(15)-X(16)-X(17)-X(18)-X(19)-(X(15)*X(8)/X(7)))/(X(15)*X
             1(9)/X(7))
0058          B(14) = X(15)/(X(5)+X(6))
0059          B(15) = (X(5)+X(6))/X(1)
0060          B(16) = X(10)/X(1)
0061          B(17) = (X(2)-X(3)-X(4))/X(2)
0062          B(18) = X(14)/X(1)
0063          DO 19 I = 1,NP
0064          IF(L .EQ. 1) DS(I,LR) = B(I)
0065       19 D(L,I) = B(I)
0066          IF(L .NE. 1) GO TO 15
0067          WRITE(6,18) (X(I),I=1,22),COST(LR)
0068       18 FORMAT(1X,'TOTAL ACRES',19X,'=',F9.3/1X,'TOTAL BLDG. BEFORE DISAST
             1ER',3X,'=',F9.3/1X,'TOTAL BLDG. DESTROYED',9X,'=',F9.3/1X,'TOTAL B
             2LDG. DAMAGED',11X,'=',F9.3/1X,'RES. ACREAGE (DWELLING)',7X,'=',F9.
             33/1X,'RES. ACREAGE (RELATED)',8X,'=',F9.3/1X,'TOTAL RES. BLDG.',14
             4X,'=',F9.3/1X,'TOTAL RES. BLDG. DESTROYED    =',F9.3/1X,'TOTAL RES
             5. BLDG. DAMAGED       =',F9.3/1X,'NONRES. ACREAGE',15X,'=',F9.3/1X,
             6'TOTAL NONRES. BLDG.',11X,'=',F9.3/1X,'TOTAL NONRES. BLDG. DESTROY
             7ED =',F9.3/1X,'TOTAL NONRES. BLDG. DAMAGED   =',F9.3/1X,'VACANT OR
             7 ',                                                              '
             8UNIMPROVED ACREAGE  =',F9.3/1X,'DWELLING UNITS BEFORE FLOOD   =',F
             99.3/1X,'UNUSABLE BUT REPARBL(NON-MIN) =',F9.3/1X,'UNUSABLE BUT REP
             AARBL(MINORTY) =', F9.3/1X,'USABLE(NON-MINORITY)',10X,'=',F9.3/1X,'
             AU',                                                              '
             8SABLE(MINORITY)',14X,'=',F9.3/1X,'TOTAL FAMILIES REMAINING',6X,'='
             8,
             CF9.3/1X,'TOTAL NON-MIN FAMILIES', 8X,'=',F9.3/1X,'TOTAL MINORITY F
             DAMILIES',7X,'=',F9.3/1X,'PROJECT COST',18X,'= $',F9.3,' MILLION.'/
             E)
       15 CONTINUE
          IF(KEY .EQ. 0) GO TO 500
          GO TO 20
       12 READ(NTI,6) ((D(L,I),I=1,NP),L=1,NV)
        6 FORMAT(10F7.0)
       16 IF(KEY .EQ. 0) GO TO 500
          READ(NTI,43) COST(LR),PCTC(LR),(XF(L,LR),L=1,NV)
       43 FORMAT(F10.3,F5.1,10F7.2)
       20 IF(NTD.EQ.5 ) GO TO 500
          WRITE(NTD,7) ((D(L,I),I=1,NP),L=1,NV)
        7 FORMAT(10F7.3)
          WRITE(NTD,43) COST(LR),PCTC(LR),(XF(L,LR),L=1,NV)
      500 RETURN
          END
```

FIGURE B-13 (CONTINUED)
SVA PROGRAM LISTING

```
0001          SUBROUTINE  VAUL(IFF)
0002          COMMON F(10,2),PMAX(100),PMIN(100),PCURVE(100),PSCALE(100),
             1NBK(100),BKX(100,3),BKY(100,3), BKSLOP(100,3),WTS(100),D(10,100),
             2DIM(11,100),PMAXY(100),PMINY(100),PSLOPE(100),PRANGE(100),C(100),
             3MOD(3),M,DTV,KEE, NTD,NTK,NTI,NB(100),ACON(100),IPAGE,NP,COST(85),
             4VAL(10,85),PCOST(10,85),VAU(10,85),VLOS(10,85),CS(10,85),PCTC(85),
             5LR,NPROD,NVAR(85),NCOUNT
0003          COMMON/A1/XF(10,100)
0004          DIMENSION ZZ(10,10)
0005          DIMENSION AJ(10,2)
0006          DATA AG(1,1)/'    '/
0007          NV = NVAR(LR)
0008          IF(KEE .EQ. 0) NV = 1
0009          DO 110 L = 1,NV
0010          DO 110 I = 1,NP
0011          ZZ(L,I) = -54.
0012          IF(D(L,I) .GE. PMIN(I) .AND. D(L,I) .LE. PMAX(I)) GO TO 120
0013          ZZ(L,I) = D(L,I)
0014          IF(D(L,I) .LT. PMIN(I)) D(L,I)=PMIN(I)
0015          IF(D(L,I) .GT. PMAX(I)) D(L,I)=PMAX(I)
0016      120 U = D(L,I)
0017          IF(WF(I).EQ. 0) GO TO 40
0018          CALL NORM( I, U, X)
0019          GO TO 50
0020       40 X = D(L,I)
0021       50 S=PSLOP(I)
0022          B=PMINY(I)
0023          N=PCURVE(I)
0024          A = ACON(I)
0025          IF(NBK(I) ) 400,400,150
        C     BREAKPOINT COMPUTATION
0026      150 U=BKX(I,1)
0027          CALL NORM(I, U, X1)
0028          BX=X1
0029          IF( X.GE. X1) GO TO 200
0030      160 CALL CURVE( N ,A, B, X, Y, C(I), S)
0031          GO TO 420
0032      200 IF(NBK(I). GT. 1) GO TO 250
0033      230 B=BKY(I,1)
0034          S=BKSLOP(I,1)
0035          X=X-BX
0036          GO TO 160
0037      250 U=BKX(I,2)
0038          CALL NORM(I,U,X1)
0039          IF(X.GE.X1) GO TO 270
0040          GO TO 230
0041      270 BX=X1
0042          IF(NBK(I).GT.2) GO TO 350
0043      300 B=BKY(I,2)
0044          S=BKSLOP(I,2)
0045          X=X-BX
0046          GO TO 160
0047      350 U=BKX(I,3)
0048          CALL NORM(I,U,X1)
```

FIGURE B-13 (CONTINUED)
SVA PROGRAM LISTING

```
0049              IF(X.LT.X1) GO TO 300
0050              B=BKY(I,3)
0051              S=BKSLOP(I,3)
0052              X=X-X1
0053              GO TO 160
0054          400 CALL CURVE( N ,A, B, X, Y, C(I), S)
            C VAU IS A DUMMY VARIABLE
            C VLCS IS A DUMMY VARIABLE USED FOR RANK ORDERING
0055          420 VAU(L,I) = Y
0056          110 CONTINUE
0057              IF(KEE .EQ. 0) GO TO 836
0058              L = 1
0059              WRITE(6,833)
0060          833 FORMAT(1H ///1X,'DATA POINTS AND ASSOCIATED VALUE POINTS'/)
0061              WRITE(6,839)
0062          839 FORMAT(1H ,49X,'RESET DATA POINT')
0063              WRITE(6,830)
0064          830 FORMAT(1H ,'NUMBER',4X,'PARAMETER',10X,'DATA POINT',10X,'DATA EXCE
                 1EDS LIMIT',10X,'VALUE POINT'/)
0065              DO 832 I = 1,NP
0066              AQ(L,2) = D(L,I)
0067              IF(ZZ(L,I) .NE. -34.) D(L,I) = ZZ(L,I)
0068              IF(ZZ(L,I) .NE. -34.) GO TO 837
0069              WRITE(6,838) I,(PNAME(I,J),J=1,2),D(L,I),AQ(1,1),VAU(L,I)
0070          838 FORMAT(2X,I3,7X,2A4,8X,F10.4,20X,A4,17X,F7.4)
0071              GO TO 832
0072          837 WRITE(6,831) I,(PNAME(I,J),J=1,2),D(L,I),AQ(L,2),VAU(L,I)
0073          831 FORMAT(2X,I3,7X,2A4,8X,F10.4,14X,F10.4,17X,F7.4)
0074          832 IF(ZZ(L,I) .NE. -34.) D(L,I) = AQ(L,2)
0075          836 CALL MODEL(EFF)
0076              IF(KEE .EQ. 0) GO TO 600
0077              IF(LR .NE. NPROJ) GO TO 600
0078              XX = 0.
0079              DO 841 I = 1,NPROJ
0080              NV =NVAR(I)
0081              LD = NV+1
0082              IF(LD .EQ. 11) GO TO 849
0083              DO 848 JJ = LD,NCOUNT
0084              XF(JJ,I) = 0.
0085          848 VAL(JJ,I) = 0.
0086          849 DO 847 L = 1,NCOUNT
0087              DELP = NCOUNT-L
0088              PCOST(L,I) =((100.-DELP*PCTC(I))/100.)*COST(I)
0089              IF(PCOST(L,I).LT. 0.) PCOST(L,I) = 0.
0090              LL = NCOUNT+1-L
0091          847 VAU(L,I) = VAL(LL,I)
0092              NSTG = NCOUNT+1
0093              WRITE(7,843) I,NSTG,(DID(KK,I),KK=1,11)
0094          843 FORMAT(2I5,11A4)
0095              WRITE(7,850) XX,XX,(PCOST(L,I),VAU(L,I),L=1,NCOUNT)
0096          850 FORMAT(3(F10.3,F15.7))
0097          841 CONTINUE
0098              DO 851 I = 1,NPROJ
0099              DO 852 L = 1,NCOUNT
```

FIGURE B-13 (CONTINUED)
SVA PROGRAM LISTING

```
0100          LL = NCOUNT+1-L
0101     852  VAU(L,I) = VAU(L,I)*XF(LL,I)
0102          WRITE(7,852) I,NSTG,(OID(KK,I),KK=1,11)
0103          WRITE(7,853) XX,XX,(PCOST(L,I),VAU(L,I),L=1,NCOUNT)
0104     851  CONTINUE
0105          L = 1
0106          CALL RANK(L,1)
0107          DO 844 I = 1,NPROJ
0108          VLCS(L,I) = VAL(L,I)/COST(I)
0109     844  VAU(L,I) = VLCS(L,I)
0110          CALL RANK(L,2)
0111          DO 845 I = 1,NPROJ
0112     845  VLCS(L,I) = VAU(L,I)*XF(L,I)
0113          CALL RANK(L,3)
0114     600  RETURN
0115          END
```


FIGURE B-13 (CONTINUED)
SVA PROGRAM LISTING

```
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0001          SUBROUTINE [illegible](I, J, X)
0002          COMMON [illegible] (100),Z),PMAX(100),[illegible],ECONV (100),PSCAL (100),
              1BOUN(100),[illegible](100),J),BXY(100,5), [illegible](100,5),[illegible](100),D(100,100),
              2[illegible](100,100),PMAXY(100)),PMINY(100),[illegible],PSLOP(100),[illegible](100),C(100)),
              3[illegible],[illegible],ITV,KE[illegible],NTO,KTR,NTI, [illegible](100)),ACCN(100),IFZGE,NP,COST(85),
              4V[illegible](20,55),PCOST(100,55),VTU(100, 5),VLOS(100,85),[illegible](100,85),PCTC(85),
              5L[illegible],[illegible],NVA[illegible](85),NCONVT
              IF([illegible] AT (I)) 10, 10, 20
0004          10 X=( [illegible] - PMIN(I)) /( [illegible] X(I) - PMIN(I))
0005             GO TO 30
0006          20 X=(LOG10(P) - ALOG10(PMIN(I)))/(LOG10(PMAX(I))-ALOG10(PMIN(I)))
0007          30 RETURN
0008             END
```

FIGURE B-13 (CONTINUED)
SVA PROGRAM LISTING

```
0001          SUBROUTINE CURVE(N,A,B,X,Y,C,S)
0002          GO TO (1, 2, 3, 4, 5, 6, 7, 8, 9, 10,11,12,13,14, 15,16,17,18,
             1 19,20, 21),N
0003        2 Y=X**A
0004          GO TO 1000
0005        3 Y=S*X+B
0006          GO TO 1000
0007        4 Y=(1.-X )** A
0008          GO TO 1000
0009        5 Y=1. -(1.- X ) ** A
0010          GO TO 1000
0011        6 Y=A *(1./A**X -1.) /(1.- A)
0012          GO TO 1000
0013        7 Y=(1.-A**(1.-X) )/(1.- A)
0014          GO TO 1000
0015        8 Y=(A**X-A) /(1.-A)
0016          GO TO 1000
0017        9 Y=(1.-A**X) /(1.- A)
0018          GO TO 1000
0019       10 Y=SIN(1.5708 * X)
0020          GO TO 1000
0021       11 Y=1.-SIN(1.5708 * X)
0022          GO TO 1000
0023       12 Y=COS(1.5708*X)
0024          GO TO 1000
0025       13 Y=1.- COS(1.5708 *X)
0026          GO TO 1000
0027       19 Y=TANH(C*X**A)
0028          GO TO 1000
0029       20 Y=1.-TANH(C*X**A)
0030          GO TO 1000
0031       16 Y=A
0032          GO TO 1000
0033       21 Y=0.
0034          IF(X.EQ.1) Y=1
0035        1 CONTINUE
0036       18 CONTINUE
0037       14 CONTINUE
0038       15 CONTINUE
0039       17 CONTINUE
0040     1000 RETURN
0041          END
```

FIGURE B-13 (CONTINUED)
SVA PROGRAM LISTING

```
0001          SUBROUTINE MODEL(EFF)
0002          COMMON PNAME(100,2),PMAX(100),PMIN(100),PCURVE(100),PSCALE(100),
             1NBK(100),BKX(100,3),BKY(100,3),BKSLOP(100,3),WTS(100),D(10,100),
             2DID(11,100),PMAXY(100),PMINY(100),PSLOP(100),PRANGE(100),C(100),
             3MOD(3),M,NTV,KEE, NTD,NTW,NTI,NF(100),ACON(100),IPAGE,NP,COST(85),
             4VAL(10,85),PCOST(10,85),VAU(10,85),VLCS(10,85),DS(18,85),PCTC(85),
0003         5LR,NPROJ,NVAR(85),NCOUNT
0004          COMMON GWTS(11),NGP,NPG(10),JF
0005          NV = NVAR(LR)
0006          IF(KEE .EQ. 0) NV = 1
0007          DO 819 J = 1,NV
0008          IF(KEE .EQ. 0) GO TO 828
0009          ZJ = J-1
0010          P = 100.-(ZJ*PCTC(LR))
0011          CA = (P*COST(LR))/100.
0012          IF(J .NE. 1) GO TO 828
0013          IPAGE = IPAGE+1
0014          WRITE(6,845) IPAGE
          845 FORMAT(1H1,'STRUCTURED VALUE OF THE DATA SET AND ITS VARIATIONS',5
             19X,'PAGE',I4)
0015          WRITE(6,827) LR,(DID(I,LR),I=1,11)
0016      827 FORMAT(1H 'PROJECT NUMBER',I5/1X,11A4///1X,'VARIATION',5X,'PERCENT
             1AGE',5X,'COST(MILLIONS)',5X,'STRUCTURED VALUE'/)
0017      828 XX = 0.
0018          LL = 0
0019          EFF = 0.0
0020          DO 820 KK = 1,NGP
0021          LI = NPG(KK)
0022          DO 821 KKK = 1,LI
0023          LL = LL+1
0024      821 XX = XX+WTS(LL)*VAU(J,LL)
0025          EFF = EFF+GWTS(KK)*XX
0026      820 XX = 0.0
0027          MY = NP-JF+1
0028          DO 822 KK = MY,NP
0029      822 EFF =VAU(J,KK)*EFF
0030          IF(KEE .EQ. 0) GO TO 854
0031          VAL(J,LR) = EFF
0032          VLCS(J,LR) = EFF
0033          WRITE(6,825) J,P,CA,VAL(J,LR)
0034      825 FORMAT(1H ,I5,10X,F6.1,9X,'$',F8.3,11X,F10.7)
0035      819 CONTINUE
0036      854 RETURN
0037          END
```

FIGURE B-13 (CONTINUED)
SVA PROGRAM LISTING

```
0001          SUBROUTINE RANK(N,JRE)
0002          COMMON PRAGE(100,2),PMAX(100),PMIN(100),PCOVF(100),PSCALE(100),
             1RAN(100),RZ(100,2),BKY(100,2),KSELP(100,5),WTS(100),C(10,100),
             2SIP(10,100),PMAXY(100),PMINY(100),SLOPE(100),PRAGE(100),C(100),
             3SUB(8),NSTV,KEE,NTD,NTW,NTI,F(100),SLP(100),IPAGE,NP,COST(85),
             4VAL(10,35),PCOST(10,35),VAU(10,35),VLCS(10,35),DS(10,35),PCTC(85),
             5L,NPROJ,RVAR(85),ICOUNT
0003          COMMON/RAZXF(10,100)
0004          COMMON/BB/PCS(5),IS,JS,Z(2,100)
0005          DIMENSION NN(100)
0006          DATA A6/'+    ','-    '/
0007          IW=1
0008          IF(N .GT. 5) IW =
0009          KK = JRE
0010          DO 910 I = 1,NP-1
0011      910 NN(I) = I
0012          NPM = NP-J-1
0013          DO 902 I = 1,NPM
0014          IF(VLCS(N,I)-VLCS(N,I+1)) 901,902,902
0015      901 DB = VLCS(N,I)
0016          VLCS(N,I) = VLCS(N,I+1)
0017          VLCS(N,I+1) = DB
0018          L = NN(I)
0019          NN(I) = NN(I+1)
0020          NN(I+1) = L
0021          J = I
0022      903 IF(J-1) 902,902,904
0023      904 IF(VLCS(N,J)-VLCS(N,J-1)) 902,902,905
0024      905 DB = VLCS(N,J)
0025          VLCS(N,J) = VLCS(N,J-1)
0026          VLCS(N,J-1) = DB
0027          L = NN(J)
0028          NN(J) = NN(J-1)
0029          NN(J-1) = L
0030          J = J-1
0031          GO TO 903
0032      902 CONTINUE
        C END OF THE ROUTINE, THE REST ARE PRINT STATEMENTS.
0033          IPC = 0
0034          DO 921 I = 1,NPMOJ
0035          L = NN(I)
0036          IF(IPC) 925,925,926
0037      925 IPC = 1
0038          LINE = 5
0039          IF(KEE .EQ. 0) GO TO 940
0040          IPAGE = IPAGE+1
0041          WRITE(6,845) IPAGE
0042      845 FORMAT(1H1,100X,'PAGE ',I3)
0043          GO TO(930,932,923),KK
0044      930 WRITE(6,931)
0045      931 FORMAT(1H ,'PROJECT RANKINGS ACCORDING TO VALUE'////3X,'PROJECT',4
             16X,'RANK',5X,'VALUE'/)
0046          GO TO 926
0047      932 WRITE(6,920)
```

FIGURE B-13 (CONTINUED)
SVA PROGRAM LISTING

```
0048          920 FORMAT(1H ,'PROJECT RANKINGS ACCORDING TO VALUE/COST RATIO'////3X,
                 1'PROJECT',46X,'RANK',5X,'VALUE',5X,'COST(MILLIONS)',5X,'VALUE/COST
                 2'/)
0049              GO TO 926
0050          923 WRITE(6,924)
0051          924 FORMAT(1H ,'PROJECT RANKINGS ACCORDING TO VALUE/(COST PER FAMILY U
                 1NIT) RATIO'////3X,'PROJECT',46X,'RANK',5X,'VALUE',5X,'COST(MILLION
                 2S)',3X,'FAMILIES',3X,'VALUE/(COST PER FAMILY UNIT)'/)
0052          926 IF(LINE-56) 927,925,925
0053          927 IF(KEE .EQ. 0) GO TO 950
0054              GO TO(933,935,929),KK
0055          933 WRITE(6,934) L,(DID(K,L),K=1,11),I,VLCS(N,I)
0056          934 FORMAT(1X,I4,2X,11A4,5X,I3,4X,F10.7)
0057              GO TO 921
0058          935 WRITE(6,922) L,(DID(K,L),K=1,11),I,VAL(N,L),COST(L),VLCS(N,I)
0059          922 FORMAT(1X,I4,2X,11A4,5X,I3,4X,F10.7,4X,F8.3,8X,F10.7)
0060              GO TO 921
0061          929 WRITE(6,928) L,(DID(K,L),K=1,11),I,VAL(N,L),COST(L),XF(N,L),VLCS(N
                 1,I)
0062          928 FORMAT(1X,I4,2X,11A4,5X,I3,4X,F10.7,4X,F8.3,6X,F8.1,9X,F13.7)
0063              GO TO 921
0064          940 IPAGE = IPAGE+1
0065              WRITE(6,845) IPAGE
0066              WRITE(6,941) IS,AB(IQ),PCS(JS)
0067          941 FORMAT(1H ,55X,'SENSITIVITY ANALYSIS'/1X,'PARAMETER',(3,' VARIES B
                 1Y ',A1,F5.1,'%.'/)
0068              LINE = LINE+3
0069              GO TO(942,943,944),KK
0070          942 WRITE(6,945)
0071          945 FORMAT(1H ,'PROJECT RANKINGS ACCORDING TO VALUE'////3X,'PROJECT',4
                 16X,'RANK',5X,'VALUE',8X,'PERCENT CHANGE'/)
0072              GO TO 950
0073          943 WRITE(6,946)
0074          946 FORMAT(1H ,'PROJECT RANKINGS ACCORDING TO VALUE/COST RATIO'////3X,
                 1'PROJECT',46X,'RANK',5X,'VALUE',5X,'COST(MILLIONS)',5X,'VALUE/COST
                 2',5X,'PERCENT CHANGE'/)
0075              GO TO 950
0076          944 WRITE(6,947)
0077          947 FORMAT(1H ,'PROJECT RANKINGS ACCORDING TO VALUE/(COST PER FAMILY U
                 1NIT) RATIO'////103X,'VALUE/(COST',8X,'PERCENT'/3X,'PROJECT',46X,'R
                 2ANK',5X,'VALUE',5X,'COST(MILLIONS)',3X,'FAMILIES',3X,'PER FAMILY U
                 3NIT)',4X,'CHANGE'/)
0078              LINE = LINE+1
0079          950 VYL = VAL(1,L)
0080              VYC = COST(L)
0081              VYV = VLCS(N,I)
0082              VXF = XF(1,L)
0083              GO TO(951,952,953),KK
0084          951 A = ((VYV-VYL)/VYL)*100.
0085              WRITE(6,954) L,(DID(K,L),K=1,11),I,VLCS(N,I),A
0086          954 FORMAT(1X,I4,2X,11A4,5X,I3,4X,F10.7,10X,F7.3)
0087              GO TO 921
0088          952 A = ((VYV-(VYL/VYC))/(VYL/VYC))*100.
0089              WRITE(6,955) L,(DID(K,L),K=1,11),I, Z(IQ,L),COST(L),VLCS(N,I),A
```

FIGURE B-13 (CONTINUED)
SVA PROGRAM LISTING

```
0090          955 FORMAT(1X,I4,2X,11A4,5X,I3,4X,F10.7,4X,F8.3,8X,F10.7,11X,F7.3)
0091              GO TO 921
0092          953 A = ((VYV-(VYL/VYC*VXF))/(VYL/VYC*VXF))*100.
0093              WRITE(6,956) L,(DID(K,L),K=1,11),I, Z(IQ,L),COST(L),XF(1,L),VLCS(N
                 1,I),A
0094          956 FORMAT(1X,I4,2X,11A4,5X,I3,4X,F10.7,4X,F8.3,6X,F8.1,4X,F13.7,7X,F7
                 1.3)
0095          921 LINE = LINE +1
0096              RETURN
0097              END
```

FIGURE B-13 (CONTINUED)
SVA PROGRAM LISTING

```
0001          SUBROUTINE SENANL
0002          COMMON PNAME(100,2),PMAX(100),PMIN(100),FCU-VE(100),PSCALE(100),
             1NBK(100),BKX(100,3),BKY(100,3),KSLOP(100,3),WTS(100),N(10,100),
             2DID(11,100),PMAXY(100),PMINY(100),PSLOP(100),PRANGE(100),C(100),
             3MOD(3),M,NTV,KEE, NTD,NTW,NTI,NF(100),ACON(100),IPAGE,NP,COST(85),
             4VAL(10,85),PCOST(10,85),VAU(10,35),VLCS(10,85),DS(10,35),PCTC(85),
             5LR,NPROJ,NVAR(85),NCOUNT
0003          COMMON/AA/XF(10,100)
0004          COMMON/BB/PCS(5),IS,JS,Z(2,100)
0005          READ(5,1) NV,(PCS(I),I=1,NV)
0006        1 FORMAT(I2,5F7.0)
0007          M =0
0008          N =I
0009          KEE = 0
0010          DO 2 JS=1,NV
0011          J = JS+5
0012          LS = JS
0013          LA = J
0014          DO 2 IS=1,NP
0015          DV = PCS(JS)/100.
0016          DO 4 K=1,NPROJ
0017          DO 6 IR=1,NP
0018        6 D(N,IR) = DS(IR,K)
0019          D(N,IS) = (1.+DV)*DS(IS,K)
0020          IF(D(N,IS) .GT. PMAX(IS)) D(N,IS) = PMAX(IS)
0021          CALL EVAUL(EFF)
0022          Z(1,K) = EFF
0023          VLCS(JS,K) = EFF
0024          D(N,IS) = (1.-DV)*DS(IS,K)
0025          IF(D(N,IS) .LT. PMIN(I)) D(N,IS) = PMIN(IS)
0026          CALL EVAUL(EFF)
0027          Z(2,K) = EFF
0028        4 VLCS(J,K) = EFF
0029          CALL RANK(LS,1)
0030          CALL RANK(LA,1)
0031          DO 5 K = 1,NPROJ
0032          VLCS(JS,K) = Z(1,K)/COST(K)
0033        5 VLCS( J,K) = Z(2,K)/COST(K)
0034          CALL RANK(LS,2)
0035          CALL RANK(LA,2)
0036          DO 7 K = 1,NPROJ
0037          VLCS(JS,K) = Z(1,K)/COST(K)*XF(1,K)
0038        7 VLCS( J,K) = Z(2,K)/COST(K)*XF(1,K)
0039          CALL RANK(LS,3)
0040          CALL RANK(LA,3)
0041        2 CONTINUE
0042          KEE = 1
0043          RETURN
0044          END
```

FIGURE B-13 (CONTINUED)
SVA PROGRAM LISTING

```
0001          SUBROUTINE SENSI
0002          COMMON PNAME(100,2),PMAX(100),PMIN(100),PCURVE(100),PSCALE(100),
             1NBK(100),BKX(100,3),BKY(100,3),BKSLOP(100,3),WTS(100),D(10,100),
             2DID(11,100),PMAXY(100),PMINY(100),PSLOP(100),PRANGE(100),C(100),
             3MOD(3),M,NTV,KEE, NTD,NTW,NT1,NF(100),ACON(100),IPAGE,NP,COST(85),
             4VAL(10,35),PCOST(10,85),VAU(10,85),VLCS(10,85),DS(18,85),PCTC(85),
             5LR,NPROJ,NVAR(85),NCOUNT
0003          DIMENSION MM(100),PCT(10),DM(100),DIFF(100,3)
0004          KEE = 0
0005          M = 0
0006          READ(5, 1) NV, (PCT(I),I=1,NV)
0007        1 FORMAT(I2,10F7.0)
0008          IF(NV.EQ.0) GO TO 200
0009       10 READ(5,2) MID,IPRINT
0010        2 FORMAT(2I2)
0011          N=1
0012          IF(MID.NE.1 ) GO TO 300
0013          DO 40 I=1,NP
0014          DM(I) = (PMAX(I)-PMIN(I))/2.+PMIN(I)
0015       40 D(N,I) = DM(I)
0016       50 CALL EVAUL(EFF)
0017          IPC=0
0018          DO 110 I=1,NP
0019          IF(IPC) 120,120,130
0020      120 IPAGE=IPAGE+1
0021          WRITE(6,3) (MOD(IX),IX=1,3),IPAGE,EFF
0022        3 FORMAT(1H1,'SENSITIVITY ANALYSIS OF PARAMETERS',3A4,20X,'PAGE',I4/
             115X,'BASE VALUE = ',F11.6)
0023          WRITE(6,4)
0024        4 FORMAT(1H0 ' DATA FOR BASE VALUE ARE : '/)
0025          LINE=5
0026          IPC=1
0027      130 IF(LINE-53) 140,120,120
0028      140 WRITE(6,115) I,(PNAME(I,J),J=1,2),D(N,I)
0029      115 FORMAT(I3,2X,2A4,F15.3)
0030          LINE=LINE+1
0031      110 CONTINUE
0032          DO 100 K=1, NV
0033          DO 60 I=1,NP
0034          MM(I)=1
0035          DV=PCT(K) *PRANGE( I) /100.
0036          D(N,I) = DM(I)+DV
0037          IF(D(N,I) .GT. PMAX(I)) D(N,I) = PMAX(I)
0038          CALL EVAUL(EFF1)
0039          D(N,I) =  DM(I)-DV
0040          IF(D(N,I) .LT. PMIN(I)) D(N,I) = PMIN(I)
0041          CALL EVAUL(EFF2)
0042          DIFF(I, 3)=(EFF1 - EFF2) *100.
0043          DIFF(I, 1)=(EFF1 - EFF ) *100. /EFF
0044          DIFF(I, 2)=(EFF2 - EFF ) *100. /EFF
0045          D(N,I) = DM(I)
0046       60 CONTINUE
0047          NP1=NP-1
0048          DO 80 I=1,NP1
```

FIGURE B-13 (CONTINUED)
SVA PROGRAM LISTING

```
0049          IF(ABS(DIFF(I,3))-ABS(DIFF(I+1, 3))) 65,30,60
0050       65 TEMP=DIFF(I,3)
0051          DIFF(I,3) = DIFF(I+1,3)
0052          DIFF(I+1,3) =TEMP
0053          L=MMI(I)
0054          MMI(I)=MMI(I+1)
0055          MMI(I+1)=L
0056          J=I
0057       70 IF(J-1) 80, 80, 75
0058       75 IF(ABS(DIFF(J,3)) - ABS(DIFF(J-1,3))) 80,80,77
0059       77 TEMP=DIFF(J,3 )
0060          DIFF(J,3 )=DIFF(J-1,3)
0061          DIFF(J-1,3) =TEMP
0062          L=MMI(J)
0063          MMI(J)=MMI(J-1)
0064          MMI(J-1)=L
0065          J=J-1
0066          GO TO 70
0067       80 CONTINUE
0068          IPC=0
0069          DO 90 I=1, NP
0070          L=MMI(I)
0071          IF(IPC) 95,95,101
0072       95 IPAGE=IPAGE+1
0073          WRITE(6,3) (MOD(IX),IX=1,3),IPAGE,EFF
0074          WRITE(6, 5) PCT(K)
0075        5 FORMAT( 1H0 'PERCENT VARIATION IS:',F8.2 //)
0076          IPC=1
0077          IF(IPRINT) 81,81,82
0078       81 WRITE(6,89)
0079       89 FORMAT(4X,' PARAMETER NAME',4X,'NUMBER  ORDER',3X,'DIFF. X100'/)
0080          GO TO 85
0081       82 WRITE(6,7)
0082        7 FORMAT(4X,' PARAMETER NAME',4X,'NUMBER  ORDER',3X,'PCT. POS.',6X,'
            1PCT. NEG.',6X,'DIFF. X100'/)
0083       85 LINE=8
0084      101 IF(LINE-58) 105, 95,95
0085      105 IF(IPRINT) 97,97,98
0086       97 WRITE(6,99) (PNAME(L,J),J=1,2),L,I,DIFF(I,3)
0087       99 FORMAT(6X,2A4,8X,I3,4X,I3,3X,F12.6)
0088          LINE=LINE+1
0089          GO TO 90
0090       98 WRITE(6,8) (PNAME(L,J),J=1,2), L, I,(DIFF(L,J),J=1,2),DIFF(I,3)
0091        8 FORMAT(6X,2A4,8X, I3, 4X,I3, 3(3X,F12.6))
0092          LINE=LINE+1
0093       90 CONTINUE
0094      100 CONTINUE
0095          GO TO 500
0096      200 NV=10
0097          DO 210 I=1,10
0098          PCT(I)=I*10
0099      210 CONTINUE
0100          GO TO 10
0101      300 NNN = NTI
```

FIGURE B 13 (CONTINUED)
SVA PROGRAM LISTING

```
0102          NTI = 5
0103          CALL BUILDD(0)
0104          NTI = NNN
0105          DO 310 I=1, NP
0106          DMII) = DIN,I)
0107      310 CONTINUE
0108          GO TO 50
0109      500 KEE = 1
0110          RETURN
0111          END
```

FIGURE B-13 (CONCLUDED)
SVA PROGRAM LISTING

APPENDIX C

DYNM4 USER'S GUIDE

INTRODUCTION

This appendix describes the dynamic programming routine DYNM4 used in the Urban Renewal Analysis. Instructions are given to assist the user in the preparation of the required input data and in the interpretation of the computer output.

In the following sections an overview of DYNM4 is presented. The input data description and format are discussed. A sample problem is formulated and sample input and output are shown and discussed. Following this, the program listings are presented.

DYNM4 was written by Drs. Mandell Bellmore, Gilbert Howard, and George Nemhauser while in the Department of Operations Research and Industrial Engineering at the Johns Hopkins University. The program was originally written in FORTRAN II and has been converted to FORTRAN IV by Dr. Stephen Lubore of The MITRE Corporation. Parts of the discussion on the basic computational scheme presented in this paper have been excerpted, with the author's permission, from a program description written by the program's authors.[165]

GENERAL OVERVIEW OF DYNM4

The class of problems which DYNM4 solves and the basic computational scheme used for solution are discussed below. In addition, a general overview of the program logic is provided.

---

[165] Bellmore, M., G. Howard and G. L. Nemhauser, Dynamic Programming Computer Model 4, Department of Operations Research and Industrial Engineering, the Johns Hopkins University, Baltimore, Maryland, July 1966.

Class of Problems Solved by DYNM4

DYNM4 is capable of solving nearly any problem which can be formulated as a single-state-variable dynamic programming problem.[166] Such problems can be expressed in the form

$$f_N(x_N) = \max_{d_N} (r_N(x_N,d_N) \; 0 \; f_{N-1})), \; N = 2,\ldots, \text{NMAX}$$

$$a_N \leq d_N \leq b_N$$

subject to

$$x_{N-1} = t_N(x_N,d_N)$$

$$f_1(x_1) = \max_{d_1} r_1(x_1,d_1)$$

$$a_1 \leq d_1 \leq b_1$$

where:

N - stage index

NMAX - the number of stages in the problem; for the urban renewal problem, each stage corresponds to one urban renewal project.

x_N - scalar state variable (input state of the system at stage N); for the urban renewal problem, the budget is the state variable.

d_N - scalar decision variable at stage N; for urban renewal projects the decisions represent the funding level for each project.

---

[166] For a complete discussion of dynamic programming see Nemhauser, G.L., Introduction to Dynamic Programming, Wiley, 1966. Most of the notation used here follows this reference.

a_N - lower bound on d_N

b_N - upper bound on d_N

r_N - the stage return, the utility obtained from stage N as a function of the state variable x_N and decision variable d_N; for the urban renewal problem, the stage return is the structured value multiplied by the number of families for the funding level selected.

t_N - the stage transformation, t_N gives the state x_{N-1} at stage N-1 as a function of x_N and d_N; for the urban renewal project, the stage transformation is the dollars available to the project minus the cost of the selected funding level.

$f_N(x_N)$ - the optimal return from stages 1 through N as a function of the state variable x_N.

O - binary composition operator that expresses how the Nth stage return is combined with the optimal return from N-1 stages. The composition operators available in the computer program are addition, multiplication (when applicable) [167] and the selection of the maximum or minimum of (r_N, f_{N-1}); for the urban renewal problem, the composition operator is maximization between each stage.

max - indicates that a maximization with respect to d_N is done at stage N. (Minimization is also possible.)

The above recursive equations are a mathematical transcription of Bellman's principle of optimality:

---

[167] Composition by multiplication works when $r_N(x_N, d_N) \geq 0$ for all N, x_N, and d_N; see Nemhauser, G.L., Op. Cit.

"An optimal policy has the property that whatever the initial state and decision are, the remaining decisions must constitute an optimal policy with regard to the state resulting from the first decision."[168]

A prototype of the kind of problem describable by the recursive equations is shown in Figure C-1. At each of NMAX stages, a decision is made which affects the return and output from that stage. The object is to determine the set of decisions $(d_1,\ldots,d_N)$ that optimizes the cumulative return from the N stages, $r_N \circ r_{N-1} \circ \ldots \circ r_1$.

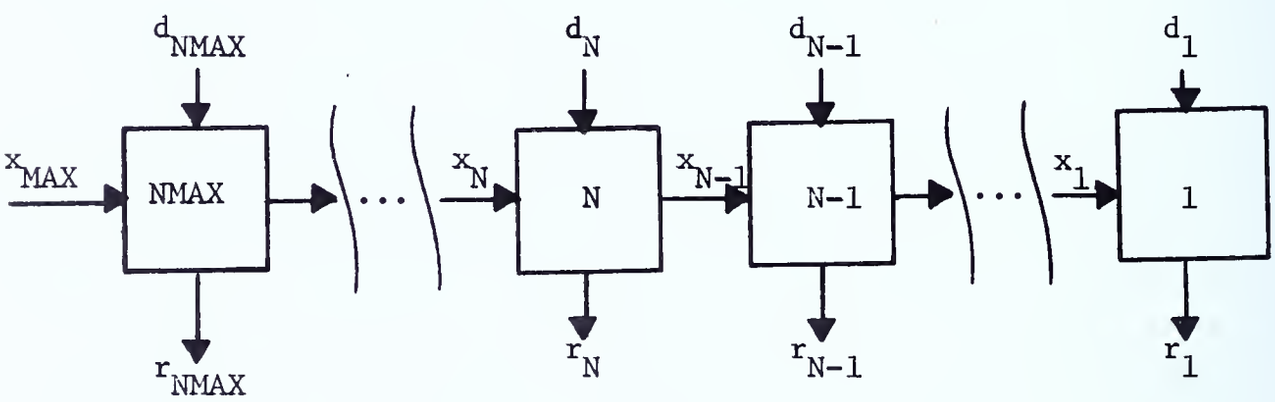

FIGURE C-1
BASIC PROBLEM STRUCTURE

[168] Bellman, R., Dynamic Programming, Princeton University Press, 1957.

Basic Computational Scheme

Figure C-2 presents the basic computational scheme used by DYNM4.

At each stage N, the state variable, x_N, is allowed to take on discrete values from $XLOW_N$ to $XHIGH_N$ in steps of $DELX_N$. These latter three values are user defined. For each value of N and x_N, $f_N(x_N)$ is computed. The optimal decision functions $d_N(x_N)$ are then determined. Each value of $d_N(x_N)$ must be such that $x_{N-1} = t_N(x_N, d_N)$ falls within the range $XLOW_{N-1}$ to $XHIGH_{N-1}$.

Once $d_{NMAX}(x_{NMAX})$ is determined, the optimal solution $d^*_{NMAX}, \ldots d_1,^*$ is computed using a back calculation. The form of the back calculation is as follows (this assumes there is a prescribed value for x_{NMAX} denoted by x^*_{NMAX}):

$$d^*_{NMAX} = d_{NMAX}(x^*_{NMAX})$$

$$d^*_N = d_N(x^*_N) \quad , \quad N = NMAX-1, \ldots 1$$

$$x^*_N = t_{N+1}(x^*_{N+1}, d^*_{N+1}), \quad N = NMAX-1, \ldots 1.$$

The optimal decision functions $d_N(x_N)$, once computed, are saved until the back calculation begins. They are stored on tape and retrieved one-at-a-time during the back calculation. This causes almost no delay in execution time of the program and saves a considerable amount of storage.

Storage requirements for the optimal return functions are somewhat different. Once $f_N(x_N)$ has been computed, $f_{N-1}(x_{N-1})$ may be discarded completely. However, during the computation of $f_N(x_N)$, $f_{N-1}(x_{N-1})$ must be readily available in core storage for every value of x_{N-1}. Values of f_N, as they are being computed, are stored.

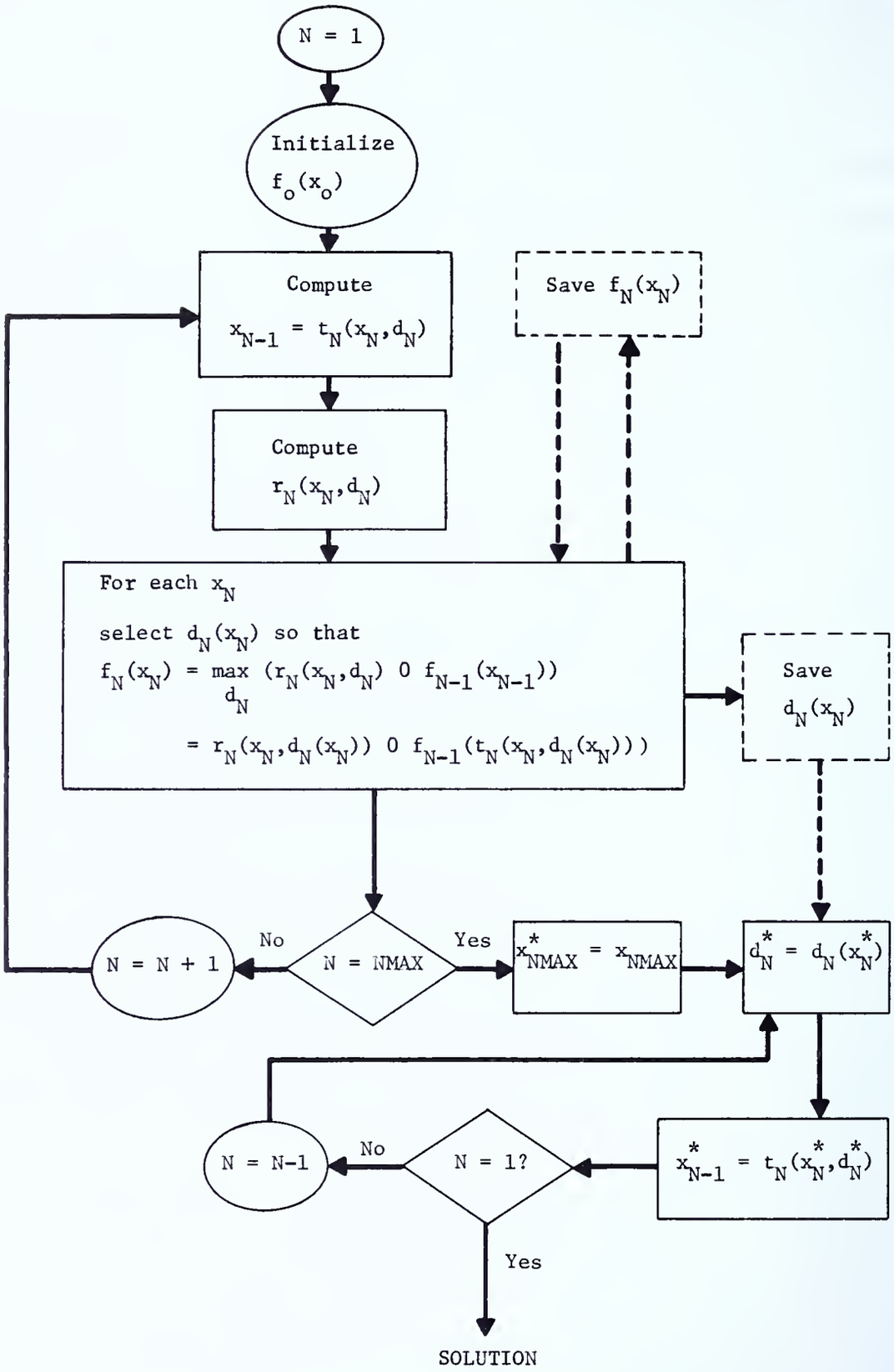

FIGURE C-2
COMPUTATIONAL FLOW

After the entire function f_N has been calculated, it is put in core storage in place of f_{N-1} so that f_{N+1} may be computed. By reserving core storage for only one optimal function, the allowable number of values of x_N is greater than if core storage were required for both f_{N-1} and f_N simultaneously. Furthermore, a negligible amount of computer time is spent by storing f_N as it is computed.

General Overview of the Program

Figure C-3 presents the overview of the logic of DYNM4.

DYNM4 consists of a main program and six subroutines.

Main Program

The main program reads in the control variables and performs the basic computational scheme discussed in the preceding section.

The type of optimization at stage N is selected by choosing either:

(a) $\max_{d_N} (r_N \; 0 \; f_{N-1})$

(b) $\min_{d_N} (r_N \; 0 \; f_{N-1})$.

There are two methods available in the program for optimizing the above functions. These are total enumeration and a Fibonacci search. The main program performs the total enumeration if this method is requested. If a Fibonacci search is requested, Subroutine SEARCH is called.

Subroutines STORE, TRANFM, STGRET and DLIMIT are called by the main program when required.

The main program prints out the optimal solutions at the end of the computation.

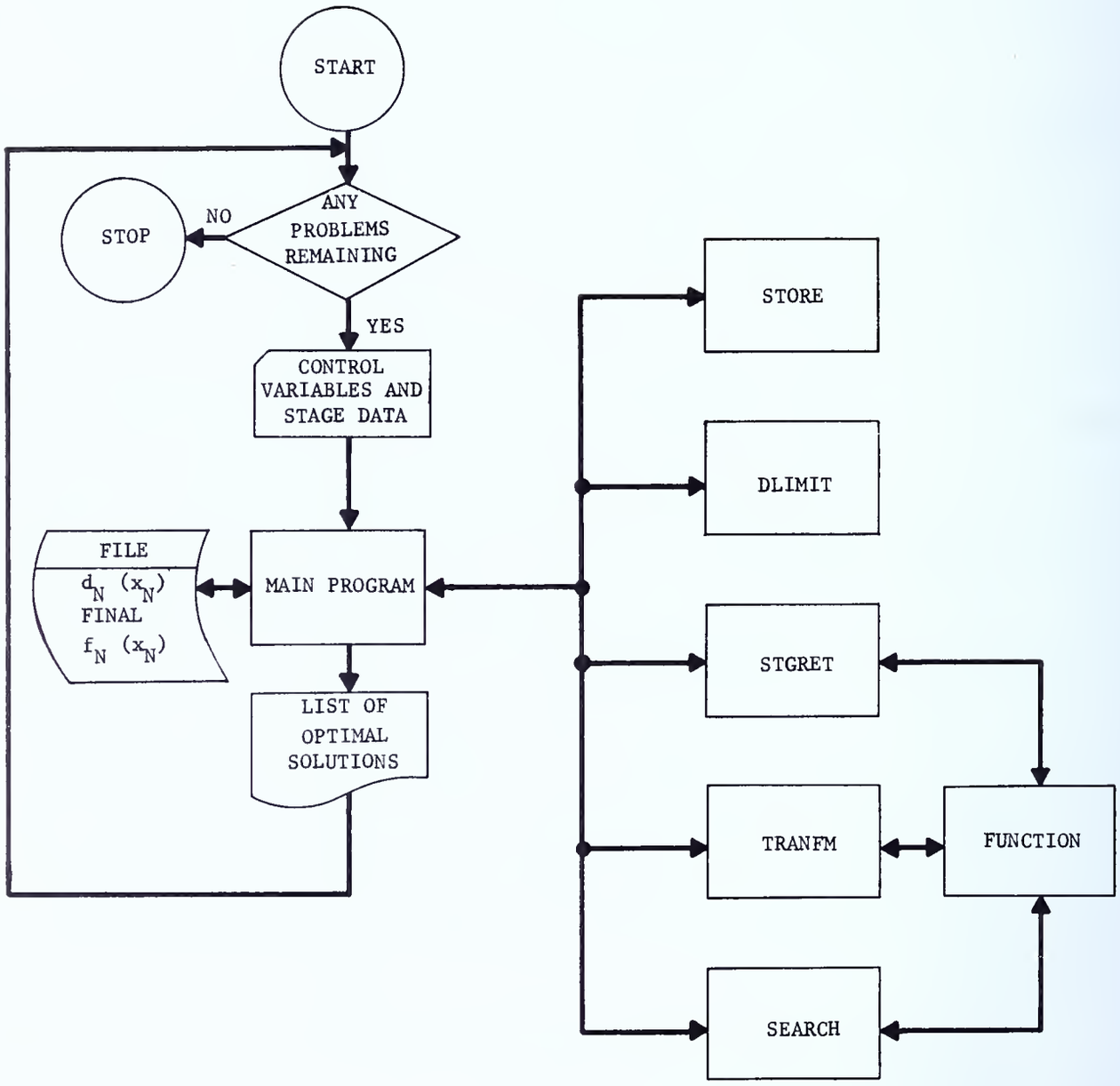

FIGURE C-3
PROGRAM STRUCTURE

Subroutine SEARCH

Subroutine SEARCH is a Fibonacci search routine. Such a routine is capable of solving the stage maximization very rapidly. However, it only guarantees finding the global optimum solution when $f_N \; 0 \; f_{N-1}$ is a unimodal[169] function of d_N for each value of x_N.

Subroutine SEARCH calls Subroutine FUNCTN. At the completion of SEARCH, control reverts to the main program.

Subroutine FUNCTN

Subroutine FUNCTN when called by SEARCH calculates the value of $f_N \; 0 \; f_{N-1}$. Subroutine TRANFM and STGRET are called during this process. Control then returns to SEARCH.

Subroutine STORE

Subroutine STORE reads in the values of the return functions and of the decision functions and also prints these values out. Control then reverts to the main program.

For the urban renewal model discussed in this paper, the value of the return function is either the Structured Value of the urban renewal project and its variations or the Structured Value times the number of families in the project and in the variation. The decision function is the cost of the project or variation.

TRANFM

Subroutine TRANFM calculates the value of the state variable x_{N-1}, where $x_{N-1} = t_N(x_N, d_N)$. Control then reverts to either the main program or FUNCTN, depending on which routine called TRANFM.

---

[169] A function is unimodal with respect to finding a maximum if it is non-decreasing for all values of the decision variable smaller than the optimum and non-increasing for all values of the decision variable larger than the optimum.

STGRET

Subroutine STGRET calculates the value of the stage return $f_N(x_N, d_N)$ for a given x_N and d_N. Control then returns to the main program or FUNCTN, depending on which routine called TRANFM.

Subroutine DLIMIT

Subroutine DLIMIT determines which decisions are feasible for a given x_N at stage N. The feasible decisions are those for which $x_{N-1} \geq 0$ (note $x_{N-1} = t_N(x_N, d_N)$.

Control then reverts to the main program.

INPUT DATA DESCRIPTION AND FORMAT

The input data is discussed in the order in which it is to be input.

Card 1 - Control Variables

All data must be right-justified. The format is (2I5,1X,A4).

Column	Variable	Description
1-5	NMAX	The number of stages (Urban Renewal Projects) in the problem.
6-10	MTAPE	Logical unit number of the main program storage device. If left blank, standard scratch unit 3 will be used.
12-15	SOLVE	Location of optimal decision functions. Solve = OLD if the optimal decision functions are stored on MTAPE. SOLVE = NEW if the optimal decision functions must be calculated and stored on MTAPE.

Cards 2 and 3 - Return and Cost for Each Project

If DYNM4 is run in conjunction with the SVA program discussed in Appendix B, cards 2 and 3 will be punched by the SVA program.

A set of cards 2 and 3 is required for each project. There will be NMAX projects.

Card 2 - Project and Decision Data

The format is (2I5,11A4).

Column	Variable	Description
1-5	I	Project identification number. Each number between 1 and NMAX must be used once and only once. However, the projects do not have to be entered in any set numerical order. I must be right-justified.
6-10	JN	The number of decisions. The number of decisions equals the number of project variations plus one. The original project is counted as one variation (see SVA User's Guide). JN is limited to 11. JN must be right-justified.
11-54	DID	The project name.

Card 3 - Return and Cost

The format is (3(F10.1, F15.7))

Column	Variable	Description
1-10	B(1,I)	The cost if project I is not undertaken. B(1,I) = 0.
11-25	A(1,I)	The return if project I is not undertaken. A(1,I) = 0.
21-35	B(2,I)	The cost of the first variation of project I.
36-50	A(2,I)	The return of the first variation of Project I.
51-60	B(3,I)	The cost of the second variation of project I.
61-75	A(3,I)	The return of the second variation of project I.

This card is repeated until all JN variations have been entered. However, for the second and subsequent cards, enter in columns 1-10

and 11-25 the cost and return of the next variation rather than the cost and return of not undertaking the project.

Note, the data for variations must be entered in the order of increasing cost. Thus, B(2,I) and A(2,I) must represent the lowest cost variation, B(JN+1,I) and A(JN+1,I) must represent the original total project cost and return.

Card 4 - Stage Data

If SOLVE = OLD, this card is not input.

If SOLVE = NEW, this card is input.

Each of the NMAX stages (projects) must be described by the card discussed below. One stage can be described per card or if the stages are similar, several adjacent stages can be described per card. The stages must be described in their numerical order starting with stage 1 and ending with stage NMAX.

All data must be right justified.

The format is (2I5, 3F10.0,2(2XA4),I3).

Column	Variable	Description
1-5	NSTAGE	Lowest numbered stage for which this card applies.
6-10	NDITTO	Highest numbered stage for which this card applies. If left blank, NDITTO will be set equal to NSTAGE.
11-20	XLOW	Lowest value of x_N at stage NSTAGE.
21-30	XHIGH	Highest value of x_N at stage NSTAGE.
31-40	DELX	Allowable increment for x_N at stage NSTAGE
41-46	XMODE	Stage optimization indicator. XMODE = MIN if stage NSTAGE is to be minimized. XMODE = MAX if stage NSTAGE is to be maximized.

Column	Variable	Description
47-52	XSTAGE	Composition Operator Indicator. XSTAGE = SUM if the composition operator between stages NSTAGE and NSTAGE-1 is addition. XSTAGE = MULT if the composition operator between stages NSTAGE and NSTAGE-1 is multiplication. XSTAGE = MINMAX if the composition operator between stages NSTAGE and NSTAGE-1 is to minimize the maximum individual stage return. XSTAGE = MAXMIN if the composition operator between stages NSTAGE and NSTAGE-1 is to maximize the minimum individual stage return. For NSTAGE = NDITTO = 1, XSTAGE may be left blank. For all other values of NSTAGE and NDITTO, one of the four options must be used.
53-55	MODES	Fibonacci search. MODES = 1 if the Fibonacci search is to be used. MODES = 2 if it is not to be used.

If NDITTO $\neq$ NMAX, this card must be repeated.

Card 5 - Printing Instructions

The format is (2(5X,F10.0),10X,I5)

Column	Variable	Description
6-15	XN1	Lowest value of x_{NMAX} for which the optimal solution is to be printed.
21-30	XN2	Highest value of x_{NMAX} for which the optimal solution is to be printed.
40-45	IX3	Starting at XN1, every IX3th solution is printed. Right justify IX3.

Determination of Next Card

If there is another problem to be solved, cards 1-5 are entered for this next problem. If there is not another problem, enter the following card, Card 6, to terminate the program.

Card 6 - Termination

The format is (11X,A4).

Column	Variable	Description
12-15	SOLVE	Set SOLVE = QUIT.

SAMPLE PROBLEM AND INPUT

Sample Problem

The sample problem described in Appendix B will be used to illustrate the input and output of the DYNM4 program.

Table C-I presents the sample parameters.

TABLE C-1

SAMPLE PROBLEM PARAMETERS

PROJECT		VARIATION	COST (MILLIONS)	STRUCTURED VALUE	(STRUCTURED VALUE) x (NO. OF FAMILIES)
NO.†	NAME				
3	AREA A	1	35.4	0.2920744	524.7990723
		2	39.8	0.2900175	586.2409668
		3	44.2	0.2883772	647.6950684
1	AREA B	1	11.7	0.1392661	125.1166077
		2	14.6	0.1356052	152.2845612
2	AREA C	1	28.1	0.3136895	288.8640137
		2	31.1	0.3085654	315.3320313
		3	34.2	0.3035796	340.9199219

† To decrease the computer processing time, the projects were renumbered from the SVA project order. The renumbering was done by project cost, lowest to highest.

Sample Input

Figure C-4 presents the input data for this problem. The data is arranged in the order in which it is to be input. The comment cards and blank cards are not part of the input.

SAMPLE OUTPUT

This section describes the output produced by DYNM4. The sample problem will be used to illustrate the output.

Cost and Return Data

Figure C-5 shows the data that is input into DYNM4 from the Structured Value Analysis Program. This data is the cost of the project and of its variations and the value of the return (Population times Structured Value) from each expenditure.

Problem Summary

Figure C-6 summarizes the problem being solved. The following information is presented:

(a) The total number of stages

(b) The logical unit on which the optimal return functions FN(XN) and the optimal decision functions DN(XN) are stored.

(c) Stage information for each stage

  (1) Type of stage optimization
  (2) Type of state variable (discrete or continuous)
  (3) Range over which the state variable is to be optimized and the allowable increments
  (4) The optimization method (total enumeration or Fibonacci search)
  (5) The composition operator between this stage, stage N, and the previous stage, stage N-1.

IBM

FORTRAN Coding Form

GX28-7327-6 U/M 050**
Printed in U.S.A.

PROGRAM DYNM4

```
C     CARD 1, CØNTRØL VARIABLES
    3     3   NEW
C     CARDS 2 AND 3, RETURN AND CØST FØR EACH PRØJECT
C     ØNE SET ØF CARDS IS REQUIRED FØR EACH PRØJECT
    1     4 AREA A
          0.0       0.0                 35.4      524.7990723       39.8      586.2409668
         44.2     647.6950684
    2     3 AREA B
          0.0       0.0                 11.7      125.1166077       14.6      152.2845612
    3     4 AREA C
          0.0       0.0                 28.1      288.8640137       31.1      315.3320313
         34.2     340.9199219
C     CARD 4, STAGE DATA
    1     3         0.        93.0       0.1     MAX    SUM  2
C     CARD 5, PRINTING INSTRUCTIØNS
              0.        93.0                1
C     CARD 6, TERMINATIØN
              QUIT
```

*A standard card form, IBM electro 888157, is available for punching statements from this form

**Number of forms per pad may vary slightly

FIGURE C-4
SAMPLE PROBLEM INPUT DATA TO DYNM4

PROJECT: 1. AREA B

COST	VALUE	COST	VALUE	COST	VALUE	COST	VALUE	COST	VALUE
0.0	0.0	11.7	125.117	14.6	152.285				

PROJECT: 2. AREA C

COST	VALUE	COST	VALUE	COST	VALUE	COST	VALUE	COST	VALUE
0.0	0.0	28.1	288.864	31.1	315.332	34.2	340.920		

PROJECT: 3. AREA A

COST	VALUE	COST	VALUE	COST	VALUE	COST	VALUE	COST	VALUE
0.0	0.0	35.4	524.799	39.8	586.241	44.2	647.695		

FIGURE C-5
RETURN AND COST DATA FOR THE SAMPLE PROBLEM

```
                    SUMMARY OF THE PROBLEM


THE PROBLEM HAS     3 STAGES.

THE PROGRAM IS TO CALCULATE TABLES OF FN(XN) AND DN(XN), AND STORE THEM ON LOGICAL TAPE     3.


THE DESCRIPTION WHICH APPEARS BELOW APPLIES TO STAGE     1 THRU STAGE     3 INCLUSIVE.


STAGE     1 THRU STAGE     3 IS A MAXIMIZATION.
THE STAGE VARIABLE(XN = THE BUDGET) IS BEING TREATED AS DISCRETE.
ITS ALLOWED RANGE IS XN = $     0.0 MILLION TO XN = $    93.0 MILLION, IN STEPS OF $     0.1 MILLION.
TOTAL ENUMERATION IS USED FOR THIS STAGE
THE COMPOSITION OPERATOR BETWEEN STAGES     0 AND     3 IS ADDITION
```

FIGURE C-6
STAGE DATA FOR THE SAMPLE PROBLEM

Solution

The solution of the dynamic programming problem is dependent upon the budget initially available for the entire urban renewal program. For each specified initial budget, DYNM4 determines the most desirable level at which to undertake each individual urban renewal project.

The user specifies the budget range and the incremental values within the range over which these solutions are to be obtained. For the sample problem solutions are obtained for budgets of $0, $0.1 million, $0.2 million, . . . $93 million.

Solutions are printed out for each of the budget increments within the range with the exception that if a solution does not change over several consecutive budget increments, the solution is printed out only for the smallest of these budget increments. Figure C-7 shows the solution for budgets of $89.9 million and $93.0 million, respectively. The solution for budgets between $90.0 million and $92.9 million are identical to the solution at $89.9 million and are not printed out.

The information printed out consists of the following:

(a) The solution number (solutions 901 through 930 were not printed out since they are identical to solution 900)

(b) The budget

(c) The maximum program return available with this budget

(d) Project data

  (1) The project name
  (2) The level (PERCENT) at which to undertake the project
  (3) The cost for this project level
  (4) The budget available before the project is selected
  (5) The budget remaining after the project is selected.

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SOLUTION NUMBER 900

WHEN THE BUDGET IS $ [illegible], THE OPTIMAL PROGRAM VALUE IS 1115.312

THE PROJECTS SELECTED ARE AS FOLLOWS:

PROJECT	PERCENT	COST	INITIAL BUDGET	BUDGET REMAINING
3. AREA A	100.00	$ 44.2	$ 89.9	$ 45.7
2. AREA C	90.94	$ 31.1	$ 45.7	$ 14.6
1. AREA B	100.00	$ 14.6	$ 14.6	$ 0.0

PAGE 32

SOLUTION NUMBER 931

WHEN THE BUDGET IS $ [illegible], THE OPTIMAL PROGRAM VALUE IS 1140.899

THE PROJECTS SELECTED ARE AS FOLLOWS:

PROJECT	PERCENT	COST	INITIAL BUDGET	BUDGET REMAINING
3. AREA A	100.00	$ 44.2	$ 93.0	$ 48.8
2. AREA C	100.00	$ 34.2	$ 48.8	$ 14.6
1. AREA B	100.00	$ 14.6	$ 14.6	$ 0.0

ELAPSED TIME FOR THIS RUN WAS 5.60240E 01 SECONDS

FIGURE C-7
SOLUTIONS FOR TWO BUDGET LEVELS

Following the final solution (solution 931 in the example), the computer processing time required to calculate all the solutions is printed.

PROGRAM LISTINGS

Figure C-8 presents the listing of the DYNM4 program.

```
              CDYNAMIC
0001                COMMON XN,N,ON,YN,RN,XLOW,XHIGH,DELX,DLOW,DHIGH,DELD,NUMBER,TAB
0002                COMMON YLOW,YHIGH,DELY,NOFF,FN,FNM1,DNDFXN,JTOP,NNFLAG,NMAX
0003                COMMON/A/JMAX(100),A(11,100),B(11,100)
0004                COMMON/B/DID(11,100),NPAGE
0005                DIMENSION TAB(4),FN(6001),FNM1(6001),DNDFXN(6001)
0006                DIMENSION BAB(4)
0007                DATA HOLMIN/4H MIN/,BAB/4H SUM,4HMULT,4HXMIN,4HNMAX/
0008                DATA HOLOLD/4H OLD/,QUIT/4HQUIT/
0009                MAX = 6001
0010                INTAPE=5
0011                NOUTPE=6
0012                DO 1 I=1,4
0013              1 TAB(I)=BAB(I)
0014                CALL SEARCH(0.0,0.0,-1.0,0.0,DNBEST,BEST)
0015                NPAGE=0
0016                NUMBER=0
0017            240 READ(INTAPE,100)NMAX,MTAPE,SOLVE
0018            100 FORMAT(2I5,1X A4)
0019                IF(SOLVE.EQ.QUIT)CALL EXIT
0020                NDITTO=0
0021                CALL SETCLK
0022            405 IF(MTAPE) 322,322,172
0023            322 MTAPE=3
0024            172 NTAPE=MTAPE
0025                REWIND MTAPE
0026                NUMBER=NUMBER+1
0027                NPAGE=NPAGE+1
0028                CALL STORE
0029                WRITE(NOUTPE,152)NPAGE
0030            152 FORMAT(1H1100X4HPAGE I4)
0031                WRITE(NOUTPE,5)
0032              5 FORMAT(/54X,'SUMMARY OF THE PROBLEM'///)
0033                WRITE(NOUTPE,306) NMAX
0034            306 FORMAT(1H ,'THE PROBLEM HAS',I5,' STAGES.'/)
0035                IF(SOLVE-HOLOLD) 301,302,301
0036            302 NSS2=1
0037                WRITE(NOUTPE,303)MTAPE
0038            303 FORMAT(1H ,'THE TABLES OF FN(XN) AND DN(XN) WHICH ARE ON LOGICAL T
                   1APE',I5,'WILL BE USED TO SOLVE THIS PROBLEM.')
0039                READ(MTAPE)NMAX
0040                REWIND MTAPE
0041                GO TO 314
0042            301 NSS2=0
0043                WRITE(NOUTPE,305)MTAPE
0044            305 FORMAT(1H ,'THE PROGRAM IS TO CALCULATE TABLES OF FN(XN) AND DN(XN
                   1), AND STORE THEM ON LOGICAL TAPE',I5,'.')
0045            500 WRITE(MTAPE)NMAX
0046            314 IF(NSS2) 197,109,197
0047            109 LINES = 9
0048            121 DO 123 N=1,NMAX
0049                NM1=N-1
0050                IF(NDITTO-N) 241,132,132
0051            241 READ(INTAPE,124)NSTAGE,NDITTO,XLOW,XHIGH,DELX,XMODE,XSTAGE,MODES
```

FIGURE C-8
DYNM4 LISTING

```
0052          124 FORMAT(2I5,3F10.0,2I2XA4,I3)
0053              IF(LINES-47) 30,30,31
0054           31 NPAGE=NPAGE+1
0055              WRITE(NOUTPE,152)NPAGE
0056              WRITE(NOUTPE,5)
0057              LINES = 6
0058           30 LINES=LINES+5
0059              ITOP=(XHIGH-XLOW)/DELX+1.001
0060              IF(MODES-1) 600,601,600
0061          600 MODES=-1
0062          601 IF(NSTAGE-N) 125,245,125
0063          125 WRITE(NOUTPE,127)
0064          127 FORMAT(23H1DATA CARD OUT OF ORDER)
0065              CALL EXIT
0066          245 IF(NSTAGE-NDITTO) 246,126,126
0067          246 WRITE(NOUTPE,247) NSTAGE,NDITTO
0068          247 FORMAT(///1X,'THE DESCRIPTION WHICH APPEARS BELOW APPLIES TO STAGE
                 1',I5,' THRU STAGE',I5,' INCLUSIVE.')
0069              LINES=LINES+4
0070          126 IF(XMODE-HOLMIN) 230,231,230
0071          231 XMODE=1.0
0072              WRITE(NOUTPE,232) NSTAGE,NOITTO
0073          232 FORMAT(//1X,'STAGE',I5,' THRU STAGE',I5,' IS A MINIMIZATION.')
0074              GO TO 520
0075          230 XMODE=-1.0
0076              WRITE(NOUTPE,234) NSTAGE,NOITTO
0077          234 FORMAT(//1X,'STAGE',I5,' THRU STAGE',I5,' IS A MAXIMIZATION.')
0078          520 DO 129 I=1,4
0079              IF(XSTAGE-TAB(I)) 129,130,129
0080          129 CONTINUE
0081          521 NNFLAG=5
0082              GO TO 502
0083          130 NNFLAG=I
0084          502 IF(ITOP-MAX) 316,316,112
0085          316 WRITE(NOUTPE,110)XLOW,XHIGH,DELX
0086          110 FORMAT(1H 'THE STAGE VARIABLE(XN = THE BUDGET) IS BEING TREATED AS
                 1 DISCRETE.'/1X,'ITS ALLOWED RANGE IS XN = $',F7.1,' MILLION TO XN
                 2= $',F7.1,' MILLION, IN STEPS OF $',F7.1,' MILLION.')
0087              IF(MODES) 318,318,321
0088          318 WRITE(NOUTPE,510)
0089          510 FORMAT(41H TOTAL ENUMERATION IS USED FOR THIS STAGE)
0090              GO TO 320
0091          321 WRITE(NOUTPE,511)
0092          511 FORMAT(40H FIBONACCI SEARCH IS USED FOR THIS STAGE)
0093          320 GO TO (11,12,13,14,132),NNFLAG
0094           11 WRITE(NOUTPE,16) NM1,NOITTO
0095           16 FORMAT(40H THE COMPOSITION OPERATOR BETWEEN STAGES(I6,4H AND(I6,12H
                 1IS ADDITION)
0096              GO TO 132
0097           12 WRITE(NOUTPE,17) NM1,NDITTO
0098           17 FORMAT(40H THE COMPOSITION OPERATOR BETWEEN STAGES(I6,4H AND(I6,18H
                 1IS MULTIPLICATION)
0099              GO TO 132
0100           13 WRITE(NOUTPE,18) NM1,NDITTO
```

FIGURE C-8 (CONTINUED)
DYNM4 LISTING

```
0101          18 FORMAT(40H THE COMPOSITION OPERATOR BETWEEN STAGESI6,4H ANDI6,34H
                1IS TO MAXIMIZE THE MINIMUM RETURN)
0102             GO TO 132
0103          14 WRITE(NOUTPE,19) NM1,NDITTO
0104          19 FORMAT(40H THE COMPOSITION OPERATOR BETWEEN STAGESI6,4H ANDI6,34H
                1IS TO MINIMIZE THE MAXIMUM RETURN)
0105         132 DO 136 I=1,ITOP
0106         134 BEST=1.0E+35*XMODE
0107             X=I-1
0108             XN=XLOW+X*DELX
0109             NUFF=1
0110             CALL DLIMIT
0111             IF(MODES) 602,602,603
0112         603 CALL SEARCH(DLOW,DHIGH,DELD,XMODE,DNBEST,BEST)
0113             GO TO 400
0114         602 KTOP=(DHIGH-DLOW)/DELD+1.001
0115         223 DO 137 J=1,KTOP
0116             X=J-1
0117             DN=DLOW+X*DELD
0118             CALL TRANFM
0119             CALL STGRET
0120             IF(NUFF) 400,401,401
0121         401 IF(N-1) 504,504,503
0122         504 QN=RN
0123             GO TO 143
0124         503 K=(YN-YLOW)/DELY+1.001
0125             IF(K) 212,212,209
0126         212 WRITE(NOUTPE,210)N,XN,DN,YN
0127         210 FORMAT(///9H AT STAGEI5,9H WITH XN#E15.8,3H AND DN#E15.8,12H XN-1
                1EQUALSE16.8,21H AND IS OUT OF LIMITS///)
0128             CALL EXIT
0129         209 IF(K-JTOP) 205,206,212
0130         206 RNM1=FNM1(JTOP)
0131             GO TO 207
0132         205 X=K-1
0133             X=YLOW+X*DELY
           C ****************
           C     RNM1#FNM1%K<&%FNM1%K&1<-FNM1%K<<*%YN-X</DELY
0134             RNM1 = FNM1(K)
           C ****************
0135         207 GO TO (21,22,23,24,248),NNFLAG
0136         248 WRITE(NOUTPE,249)N
0137         249 FORMAT(43H1COMPOSITION OPERATOR NOT DEFINED FOR STAGE,I5)
0138             CALL EXIT
0139          21 QN=RN+RNM1
0140             GO TO 143
0141          22 QN=RN*RNM1
0142             GO TO 143
0143          23 IF(RN-RNM1) 141,141,142
0144         141 QN=RN
0145             GO TO 143
0146         142 QN=RNM1
0147             GO TO 143
0148          24 IF(RN-RNM1) 145,145,146
```

FIGURE C-8 (CONTINUED)
DYNM4 LISTING

```
0149          145 QN=RN*1
0150              GO TO 143
0151          146 QN=RN
0152          143 IF((QN-BEST)*XMODE) 144,137,137
0153          144 BEST=QN
0154              DNBEST=DN
0155          137 CONTINUE
0156          400 FN(I)=BEST
0157              DNOFXN(I)=DNBEST
0158          136 CONTINUE
0159              WRITE(NTAPE)XLOW,XHIGH,DELX,ITOP,XMODE
0160              WRITE(NTAPE)(DNOFXN(II),II=1,ITOP)
0161              DO 402 I=1,ITOP
0162          402 FNM1(I)=FN(I)
0163              YLOW=XLOW
0164              YHIGH=XHIGH
0165              DELY=DELX
0166              JTOP=ITOP
0167          123 CONTINUE
0168              WRITE(NTAPE)(FN(II),II=1,(TOP)
0169          161 END FILE MTAPE
0170          197 REWIND MTAPE
0171              READ(MTAPE)NMAX
0172              N=NMAX
0173              J=N-1
0174              IF(J) 407,407,201
0175          201 DO 522 I=1,J
0176              READ(MTAPE)
0177          522 READ(MTAPE)
0178          407 READ(MTAPE)XLOW,XHIGH,DELX,ITOP,XMODE
0179              READ(MTAPE)
0180              READ(MTAPE)(FN(I),I=1,ITOP)
0181              BACKSPACE MTAPE
0182              BACKSPACE MTAPE
0183              READ(INTAPE,162)XN1,XN2
0184          162 FORMAT(2(5X,F10.0),10X,I5)
0185          181 IF(XN1.GT.XN2)XN1=XN2
0186          171 IF(XLOW.GT.XN1)XN1=XLOW
0187          175 IF(XHIGH.LT.XN2)XN2=XHIGH
0188          178 IX1=(XN1-XLOW)/DELX+1.001
0189              IX2=(XN2-XLOW)/DELX+1.001
0190              BEST=1.0E+35*XMODE
0191              DO 182 J=IX1,IX2
0192              IF(FN(J).EQ.BEST)GO TO 182
0193              BEST=FN(J)
0194              X=J-1
0195              XN=XLOW+X*DELX
0196              NPAGE=NPAGE+1
0197              WRITE(NOUTPE,152)NPAGE
0198              WRITE(NOUTPE,4) J
0199            4 FORMAT(55X,'SOLOTION NUMBER',I6/)
0200              WRITE(NOUTPE,184)XN,FN(J)
0201          184 FORMAT(1H ,'WHEN THE BUDGET IS $',F7.1,', THE OPTIMAL PROGRAM VALU
                 1E IS',F14.3,   ///1X,'THE PROJECTS SELECTED ARE AS FOLLOWS:'/)
```

FIGURE C-8 (CONTINUED)
DYNM4 LISTING

```
                 2)
0202                 READ(MTAPE)(DNOFXN(I),I=1,ITOP)
0203             186 DN=DNOFX(NJ)
0204                 CALL TRANFM
0205             204 WRITE(NOUTPE,188)
0206             188 FORMAT(1H ,'PROJECT',49X,'PERCENT',13X,'COST',7X,'INITIAL BUDGET',
                    15X,'BUDGET REMAINING')
0207                 NN=0
0208             203 J1 = DN+.001
0209                 J2 = JMAX(N)
0210                 PCT = 100.*B(J1,N)/B(J2,N))
0211                 COST = XN-YN
0212                 WRITE(NOUTPE,189) N,(DID(KK,N),KK=1,11),PCT,COST,XN,YN
0213             189 FORMAT(I7,'.',1X,11A4,5X,F8.2,7X,'$',F7.1,8X,'$',F7.1,12X,'$',F7.1)
0214                 NN=NN+1
0215                 N=N-1
0216                 IF(N-1)135,193,193
0217             185 REWIND MTAPE
0218                 READ(MTAPE)NMAX
0219                 N=NMAX
0220                 IF(N.EQ.1)GO TO 2
0221                 JJ=N-1
0222                 DO 3 I=1,JJ
0223                 READ(MTAPE)
0224               3 READ(MTAPE)
0225               2 READ(MTAPE)XLOW,XHIGH,DELX,ITOP,XMODE
0226             182 CONTINUE
0227             244 CALL READCL(Z)
0228                 WRITE(NOUTPE,243)Z
0229             243 FORMAT(//30H ELAPSED TIME FOR THIS RUN WAS,1PE14.5,8H SECONDS)
0230                 GO TO 240
0231             193 DO 406 I=1,4
0232             406 BACKSPACE MTAPE
0233                 READ(MTAPE)XLOW,XHIGH,DELX,ITOP,XMODE
0234                 READ(MTAPE)(DNOFXN(I),I=1,ITOP)
0235                 L=(YN-XLOW)/DELX+1.001
0236                 IF(L) 214,214,215
0237             214 L=1
0238             219 NP1=N+1
0239                 WRITE(NOUTPE,210)NP1,XN,DN,YN
0240                 NN=NN+7
0241             215 IF(L-ITOP) 218,216,217
0242             216 DN=DNOFXN(L)
0243                 XN=YN
0244                 GO TO 196
0245             217 L=ITOP
0246                 GO TO 219
0247             218 XN=YN
0248             194 X=L-1
0249                 X=XLOW+X*DELX
           C ****************
           C         DN#DNOFXN%L<&&DNOFXN%L&1<-DNOFXN%L<<*%XN-X</DELX
0250                 IDN = DNOFXN(L)+.001
0251                 DN = IDN
```

FIGURE C-8 (CONTINUED)
DYNM4 LISTING

```
C ****************
  196 CALL TRANFM
      IF(NN-47) 203,203,220
  220 NPAGE=NPAGE+1
      WRITE(NOUTPE,152)NPAGE
      WRITE(NOUTPE,4) J
      GO TO 204
  112 WRITE(NOUTPE,113)MAX,ITOP
  113 FORMAT(/2H THIS PROGRAM LIMITS THE NUMBER OF DISCRETE STEPS OF THE
     1STATE VARIBLE TO16,26H AND THIS PROBLEM REQUIRES16)
      CALL EXIT
      END
```

FIGURE C-8 (CONTINUED)
DYNM4 LISTING

```
0001          SUBROUTINE SEARCH(AA,BB,DELYY,XXMODE,YYBEST,BEST)
        CSEARCH       DISCRETE FIBONACCI SEARCH SUBROUTINE
0002          DIMENSION F(150)
        C
        C     OPTIMIZE WITH RESPECT TO Y BETWEEN AA AND BB IN STEPS OF DELYY
        C     STORE OPTIMUM Y IN YYBEST AND THE OPTIMUM VALUE OF THE OBJECTIVE
        C     FUNCTION IN BEST
        C     XXMODE#-1 FOR MAXIMIZE
        C     XXMODE#1  FOR MINIMIZE
        C     SUBROUTINE MUST BE INITIALIZED BY CALLING IT WITH DELYY#-1.0 AT
        C     LEAST ONCE BEFORE IT IS USED FOR A SEARCH
0003          NOUTPE=6
0004          DELY=DELYY
0005          A=AA
0006          B=BB
0007          XMODE=XXMODE
0008          IF(DELY) 100,100,101
0009      100 F(1)=1.0
0010          F(2)=2.0
0011          DO 1 I=3,150
0012          F(I)=F(I-1)+F(I-2)+1.0
0013          IF(F(I)-1.0E+35) 1,2,2
0014        2 II=I
0015          RETURN
0016        1 CONTINUE
0017          II=150
0018          RETURN
0019      101 YHI=B
0020          YLO=A
0021          FND=(YHI-YLO)/DELY+1.0
0022          DO 5 N=1,II
0023          IF(FND-F(N)) 6,6,5
0024        5 CONTINUE
0025          WRITE(NOUTPE,7)
0026        7 FORMAT(33H1ERROR, TOO MANY POINTS TO BE SEARCHED)
0027          CALL EXIT
0028        6 IF(N-2) 42,41,40
0029       40 Y1=F(N-2)*DELY+YLO
0030          CALL FUNCTN(Y1,GY1)
0031          Y2=F(N-1)*DELY+YLO
0032          CALL FUNCTN(Y2,GY2)
0033       16 N=N-1
0034          IF(N-1) 102,102,103
0035      103 IF((GY2-GY1)*XMODE) 19,19,20
0036       19 YLO=Y1+DELY
0037          Y1=Y2
0038          GY1=GY2
0039          Y2=F(N-1)*DELY+YLO
0040          IF(Y2-B) 104,104,105
0041      105 GY2=1.0E+35*XMODE
0042          GO TO 16
0043      104 CALL FUNCTN(Y2,GY2)
0044          GO TO 16
0045       20 YHI=Y2-DELY
```

FIGURE C-8 (CONTINUED)
DYNM4 LISTING

```
0046          Y2=Y1
0047          GY2=GY1
0048          IF(N-2) 34,34,35
0049       34 FNM2=0.0
0050          GO TO 36
0051       35 FNM2=F(N-2)
0052       36 Y1=FNM2*DELY+YLO
0053          CALL FUNCTN(Y1,GY1)
0054          GO TO 16
0055      102 IF((GY2-GY1)*XMODE) 110,111,111
0056      110 YYBEST=Y2
0057          BEST=GY2
0058          RETURN
0059      111 YYBEST=Y1
0060          BEST=GY1
0061          RETURN
0062       41 Y1=A
0063          CALL FUNCTN(Y1,GY1)
0064          Y2=B
0065          CALL FUNCTN(Y2,GY2)
0066          GO TO 102
0067       42 Y1=A
0068          CALL FUNCTN(Y1,GY1)
0069          GO TO 111
0070          END
```

FIGURE C-8 (CONTINUED)
DYNM4 LISTING

```
0001          SUBROUTINE STORE
0002          COMMON XN,N,DN,YN,RN,XLOW,XHIGH,DELX,DLOW,DHIGH,DELD,NUMBER,TAB
0003          COMMON YLOW,YHIGH,DELY,NUFF,FN,FNM1,DNDFXN,JTOP,NNFLAG,NMAX
0004          DIMENSION TAB(4),FN(6001),FNM1(6001),DNDFXN(6001)
0005          COMMON/A/JMAX(100),A(11,100),B(11,100)
0006          COMMON/B/DID(11,100),NPAGE
0007          INTAPE=5
0008          KK = 0
0009          DO 102 I = 1,NMAX
0010          IF(KK .EQ. 1) GO TO 1
0011          WRITE(6,101) NPAGE
0012      101 FORMAT(1H1,45X,'INPUT DATA FROM STRUCTURED VALUE ANALYSIS',30X,'PA
             1GE',I4)
0013          KK = 1
0014          LINES = 1
0015          NPAGE=NPAGE+1
0016        1 READ(INTAPE,100) I,JN,(DID(K,I),K=1,11)
0017      100 FORMAT(2I5,11A4)
0018          READ(INTAPE,104) (B(J,I),A(J,I),J=1,JN)
0019      104 FORMAT(3(F10.1,F15.7))
0020          WRITE(6,103) I,(DID(K,I),K=1,11)
0021      103 FORMAT(///1X,'PROJECT:',5X,I3,'.',1X,11A4/)
0022          WRITE(6,105)
0023      105 FORMAT(1H ,4X,'COST',7X,'VALUE',4(9X,'COST',7X,'VALUE')//)
0024          WRITE(6,106) (B(J,I),A(J,I),J=1,JN)
0025      106 FORMAT(5(1X,F9.1,1X,F14.7))
0026          LINES = LINES+9
0027          IF(LINES .GE. 55) KK = 0
0028      102 JMAX(I) = JN
0029          RETURN
0030          END
```

FIGURE C-8 (CONTINUED)
DYNM4 LISTING

```
FORTRAN IV G LEVEL  21                    STGRET              DATE = 73150          19/31/23              PAGE 0001

0001                SUBROUTINE STGRET
0002                COMMON XN,N,DN,YN,RN,XLOW,XHIGH,DELX,DLOW,DHIGH,DELD,NUMBER,TAB
0003                COMMON YLOW,YHIGH,DELY,NUFF,FN,FNM1,DNDFXN,JTOP,NNFLAG,NMAX
0004                DIMENSION TAB(4),FN(6001),FNM1(6001),DNDFXN(6001)
0005                COMMON/A/JMAX(100),A(11,100),B(11,100)
0006                J=DN+0.001
0007                RN=A(J,N)
0008                RETURN
0009                END
```

```
FORTRAN IV G LEVEL  21                    TRANFM              DATE = 73150          19/31/28              PAGE 0001

0001                SUBROUTINE TRANFM
0002                COMMON XN,N,DN,YN,RN,XLOW,XHIGH,DELX,DLOW,DHIGH,DELD,NUMBER,TAB
0003                COMMON YLOW,YHIGH,DELY,NUFF,FN,FNM1,DNDFXN,JTOP,NNFLAG,NMAX
0004                DIMENSION TAB(4),FN(6001),FNM1(6001),DNDFXN(6001)
0005                COMMON/A/JMAX(100),A(11,100),B(11,100)
0006                J=DN+0.001
0007                YN=XN-B(J,N)
0008                RETURN
0009                END
```

```
FORTRAN IV G LEVEL  21                    DLIMIT              DATE = 73150          19/31/28              PAGE 0001

0001                SUBROUTINE DLIMIT
0002                COMMON XN,N,DN,YN,RN,XLOW,XHIGH,DELX,DLOW,DHIGH,DELD,NUMBER,TAB
0003                COMMON YLOW,YHIGH,DELY,NUFF,FN,FNM1,DNDFXN,JTOP,NNFLAG,NMAX
0004                DIMENSION TAB(4),FN(6001),FNM1(6001),DNDFXN(6001)
0005                COMMON/A/JMAX(100),A(11,100),B(11,100)
0006                DLOW=1.0
0007                DELD=1.0
0008                J=JMAX(N)
0009             30 IF(XN.GE.B(J,N))GO TO 20
0010                J=J-1
0011                GO TO 30
0012             20 DHIGH=J
0013              2 RETURN
0014                END
```

FIGURE C-8 (CONTINUED)
DYNM4 LISTING

```
0001          SUBROUTINE FUNCTN(Y,GY)
0002          COMMON XN,N,DN,YN,RN,XLOW,XHIGH,DELX,DLOW,DHIGH,DELD,NUMBER,TAB
0003          COMMON YLOW,YHIGH,DELY,NUEF,FN,FNM1,DNDFXN,JTOP,NNFLAG
0004          DIMENSION TAB(4),FN(6001),FNM1(6001),DNDFXN(6001)
0005          NOUTPE=6
0006          DN=Y
0007          CALL TRANF4
0008          CALL STGRET
0009          IF(N-1) 146,146,401
0010      401 K=(YN-YLOW)/DELY+1.001
0011          IF(K) 212,212,209
0012      212 WRITE(NOUTPE,210)N,XN,DN,YN
0013      210 FORMAT(///9H AT STAGEI5,9H WITH XN#E15.8,3H AND DN#E15.8,12H XN-1
             1EQUALSE16.8,21H AND IS OUT OF LIMITS///)
0014          CALL EXIT
0015      209 IF(K-JTOP) 205,206,212
0016      206 RNM1=FNM1(JTOP)
0017          GO TO 207
0018      205 X=K-1
0019          X=YLOW+X*DELY
        C ************
0020          RNM1=FNM1(K)
        C     RNM1#FNM1%K<&%FNM1%K&1<-FNM1%K<<*%YN-X</DELY
        C ************
0021      207 GO TO (21,22,23,24),NNFLAG
0022       21 QN=RN+RNM1
0023          GO TO 137
0024       22 QN=RN*RNM1
0025          GO TO 137
0026       23 IF(RN-RNM1) 141,141,142
0027      141 QN=RN
0028          GO TO 137
0029      142 QN=RNM1
0030          GO TO 137
0031       24 IF(RN-RNM1) 145,145,146
0032      145 QN=RNM1
0033          GO TO 137
0034      146 QN=RN
0035      137 GY=QN
0036          RETURN
0037          END
```

FIGURE C-8 (CONCLUDED)
DYNM4 LISTING

APPENDIX D

URBAN RENEWAL PROJECT DATA

The project data for each of the eighty urban renewal projects used in the analysis are presented in Tables D-1 through D-80.

The projects were numbered using the following scheme. First, the projects were grouped by region and by county within the region. Next, the projects within each county were ordered alphabetically, and then the counties were ordered alphabetically within each region.

Due to the late deletion of two projects (originally there were eighty-two projects), two projects are out of order in the numbering scheme. These are project 6, Uniontown, Fayette, and project 68, McKees Rocks, Allegheny. Both of these projects are in region 10 and originally were numbered 82 and 81 respectively. The change in project number was necessitated by a requirement in the SVA program that all project numbers be consecutive.

TABLE D-1
DATA FOR KENILWORTH, CHESTER

PROJECT NUMBER 1
KENILWORTH, CHESTER

THERE ARE 9 VARIATIONS FOR THIS PROJECT. THE BUDGET RANGE IS 20.0% TO 100.0%, IN STEPS OF 10.0%.

INPUT DATA(FOR 100% FUNDING):

TOTAL ACRES	=	19.820
TOTAL BLDG. BEFORE DISASTER	=	36.000
TOTAL BLDG. DESTROYED	=	1.000
TOTAL BLDG. DAMAGED	=	30.000
RES. ACREAGE (DWELLING)	=	6.690
RES. ACREAGE (RELATED)	=	1.080
TOTAL RES. BLDG.	=	35.000
TOTAL RES. BLDG. DESTROYED	=	1.000
TOTAL RES. BLDG. DAMAGED	=	29.000
NONRES. ACREAGE	=	0.060
TOTAL NONRES. BLDG.	=	1.000
TOTAL NONRES. BLDG. DESTROYED	=	0.0
TOTAL NONRES. BLDG. DAMAGED	=	1.000
VACANT OR UNIMPROVED ACREAGE	=	4.750
DWELLING UNITS BEFORE FLOOD	=	35.000
UNUSABLE BUT REPARBL(NON-MIN)	=	0.0
UNUSABLE BUT REPARBL(MINORTY)	=	0.0
USABLE(NON-MINORITY)	=	17.000
USABLE(MINORITY)	=	0.0
TOTAL FAMILIES REMAINING	=	15.000
TOTAL NON-MIN FAMILIES	=	15.000
TOTAL MINORITY FAMILIES	=	0.0
PROJECT COST	= $	1.319 MILLION.

TABLE D-2
DATA FOR SOUTH POTTSTOWN, CHESTER

PROJECT NUMBER 2
SOUTH POTTSTOWN, CHESTER

THERE ARE 9 VARIATIONS FOR THIS PROJECT. THE BUDGET RANGE IS 20.0% TO 100.0%, IN STEPS OF 10.0%.

INPUT DATA(FOR 100% FUNDING):

TOTAL ACRES	=	93.780
TOTAL BLDG. BEFORE DISASTER	=	243.000
TOTAL BLDG. DESTROYED	=	3.000
TOTAL BLDG. DAMAGED	=	211.000
RES. ACREAGE (DWELLING)	=	29.240
RES. ACREAGE (RELATED)	=	0.0
TOTAL RES. BLDG.	=	231.000
TOTAL RES. BLDG. DESTROYED	=	3.000
TOTAL RES. BLDG. DAMAGED	=	197.000
NONRES. ACREAGE	=	11.730
TOTAL NONRES. BLDG.	=	17.000
TOTAL NONRES. BLDG. DESTROYED	=	0.0
TOTAL NONRES. BLDG. DAMAGED	=	14.000
VACANT OR UNIMPROVED ACREAGE	=	24.520
DWELLING UNITS BEFORE FLOOD	=	254.000
UNUSABLE BUT REPARBL(NON-MIN)	=	45.000
UNUSABLE BUT REPARBL(MINORTY)	=	0.0
USABLE(NON-MINORITY)	=	134.000
USABLE(MINORITY)	=	2.000
TOTAL FAMILIES REMAINING	=	122.000
TOTAL NON-MIN FAMILIES	=	120.000
TOTAL MINORITY FAMILIES	=	2.000
PROJECT COST	=	$ 3.923 MILLION.

TABLE D-3
DATA FOR POTTSTOWN, MONTGOMERY

PROJECT NUMBER 3
POTTSTOWN, MONTGOMERY

THERE ARE 9 VARIATIONS FOR THIS PROJECT. THE BUDGET RANGE IS 20.0% TO 100.0%, IN STEPS OF 10.0%.

INPUT DATA(FOR 100% FUNDING):

TOTAL ACRES	=	111.740
TOTAL BLDG. BEFORE DISASTER	=	710.000
TOTAL BLDG. DESTROYED	=	0.0
TOTAL BLDG. DAMAGED	=	413.000
RES. ACREAGE (DWELLING)	=	51.090
RES. ACREAGE (RELATED)	=	0.0
TOTAL RES. BLDG.	=	609.000
TOTAL RES. BLDG. DESTROYED	=	0.0
TOTAL RES. BLDG. DAMAGED	=	346.000
NONRES. ACREAGE	=	11.450
TOTAL NONRES. BLDG.	=	101.000
TOTAL NONRES. BLDG. DESTROYED	=	0.0
TOTAL NONRES. BLDG. DAMAGED	=	67.000
VACANT OR UNIMPROVED ACREAGE	=	9.870
DWELLING UNITS BEFORE FLOOD	=	949.000
UNUSABLE BUT REPARBL(NON-MIN)	=	48.000
UNUSABLE BUT REPARBL(MINORTY)	=	12.000
USABLE(NON-MINORITY)	=	889.000
USABLE(MINORITY)	=	0.0
TOTAL FAMILIES REMAINING	=	935.000
TOTAL NON-MIN FAMILIES	=	923.000
TOTAL MINORITY FAMILIES	=	12.000
PROJECT COST	=	$ 2.067 MILLION.

TABLE D-4
DATA FOR BIRDSBORO, BERKS

PROJECT NUMBER 4
BIRDSBORO, BERKS

THERE ARE 9 VARIATIONS FOR THIS PROJECT. THE BUDGET RANGE IS 20.0% TO 100.0%, IN STEPS OF 10.0%.

INPUT DATA(FOR 100% FUNDING):

TOTAL ACRES	=	18.620
TOTAL BLDG. BEFORE DISASTER	=	113.000
TOTAL BLDG. DESTROYED	=	41.000
TOTAL BLDG. DAMAGED	=	28.000
RES. ACREAGE (DWELLING)	=	6.140
RES. ACREAGE (RELATED)	=	0.0
TOTAL RES. BLDG.	=	90.000
TOTAL RES. BLDG. DESTROYED	=	34.000
TOTAL RES. BLDG. DAMAGED	=	14.000
NONRES. ACREAGE	=	4.360
TOTAL NONRES. BLDG.	=	23.000
TOTAL NONRES. BLDG. DESTROYED	=	7.000
TOTAL NONRES. BLDG. DAMAGED	=	14.000
VACANT OR UNIMPROVED ACREAGE	=	3.490
DWELLING UNITS BEFORE FLOOD	=	93.000
UNUSABLE BUT REPARBL(NON-MIN)	=	0.0
UNUSABLE BUT REPARBL(MINORITY)	=	0.0
USABLE(NON-MINORITY)	=	64.000
USABLE(MINORITY)	=	0.0
TOTAL FAMILIES REMAINING	=	58.000
TOTAL NON-MIN FAMILIES	=	58.000
TOTAL MINORITY FAMILIES	=	0.0
PROJECT COST	= $	1.546 MILLION.

TABLE D-5
DATA FOR READING (MODEL CITIES), BERKS

PROJECT NUMBER 5
READING(MODEL CITIES), BERKS

THERE ARE 9 VARIATIONS FOR THIS PROJECT. THE BUDGET RANGE IS 20.0% TO 100.0%, IN STEPS OF 10.0%.

INPUT DATA(FOR 100% FUNDING):

TOTAL ACRES	=	79.950
TOTAL BLDG. BEFORE DISASTER	=	797.000
TOTAL BLDG. DESTROYED	=	66.000
TOTAL BLDG. DAMAGED	=	539.000
RES. ACREAGE (DWELLING)	=	26.370
RES. ACREAGE (RELATED)	=	3.070
TOTAL RES. BLDG.	=	721.000
TOTAL RES. BLDG. DESTROYED	=	66.000
TOTAL RES. BLDG. DAMAGED	=	492.000
NONRES. ACREAGE	=	23.530
TOTAL NONRES. BLDG.	=	76.000
TOTAL NONRES. BLDG. DESTROYED	=	0.0
TOTAL NONRES. BLDG. DAMAGED	=	47.000
VACANT OR UNIMPROVED ACREAGE	=	20.300
DWELLING UNITS BEFORE FLOOD	=	913.000
UNUSABLE BUT REPARBL(NON-MIN)	=	296.000
UNUSABLE BUT REPARBL(MINORTY)	=	133.000
USABLE(NON-MINORITY)	=	287.000
USABLE(MINORITY)	=	129.000
TOTAL FAMILIES REMAINING	=	331.000
TOTAL NON-MIN FAMILIES	=	228.000
TOTAL MINORITY FAMILIES	=	103.000
PROJECT COST	=	$ 16.968 MILLION.

TABLE D-6
DATA FOR UNIONTOWN, FAYETTE

PROJECT NUMBER 6
UNIONTOWN, FAYETTE

THERE ARE 9 VARIATIONS FOR THIS PROJECT. THE BUDGET RANGE IS 20.0% TO 100.0%, IN STEPS OF 10.0%.

INPUT DATA(FOR 100% FUNDING):

TOTAL ACRES	=	168.590
TOTAL BLDG. BEFORE DISASTER	=	557.000
TOTAL BLDG. DESTROYED	=	0.0
TOTAL BLDG. DAMAGED	=	392.000
RES. ACREAGE (DWELLING)	=	38.490
RES. ACREAGE (RELATED)	=	7.430
TOTAL RES. BLDG.	=	302.000
TOTAL RES. BLDG. DESTROYED	=	0.0
TOTAL RES. BLDG. DAMAGED	=	233.000
NONRES. ACREAGE	=	67.700
TOTAL NONRES. BLDG.	=	255.000
TOTAL NONRES. BLDG. DESTROYED	=	0.0
TOTAL NONRES. BLDG. DAMAGED	=	159.000
VACANT OR UNIMPROVED ACREAGE	=	7.190
DWELLING UNITS BEFORE FLOOD	=	634.000
UNUSABLE BUT REPARBL(NON-MIN)	=	94.000
UNUSABLE BUT REPARBL(MINORTY)	=	0.0
USABLE(NON-MINORITY)	=	534.000
USABLE(MINORITY)	=	1.000
TOTAL FAMILIES REMAINING	=	594.000
TOTAL NON-MIN FAMILIES	=	593.000
TOTAL MINORITY FAMILIES	=	1.000
PROJECT COST	=	$ 12.690 MILLION.

TABLE D-7
DATA FOR READING (SCHUYLKILL), BERKS

PROJECT NUMBER 7
READING(SCHUYLKILL), BERKS

THERE ARE 9 VARIATIONS FOR THIS PROJECT. THE BUDGET RANGE IS 20.0% TO 100.0%, IN STEPS OF 10.0%.

INPUT DATA(FOR 100% FUNDING):

TOTAL ACRES	=	56.730
TOTAL BLDG. BEFORE DISASTER	=	523.000
TOTAL BLDG. DESTROYED	=	71.000
TOTAL BLDG. DAMAGED	=	47.000
RES. ACREAGE (DWELLING)	=	15.380
RES. ACREAGE (RELATED)	=	1.120
TOTAL RES. BLDG.	=	477.000
TOTAL RES. BLDG. DESTROYED	=	58.000
TOTAL RES. BLDG. DAMAGED	=	28.000
NONRES. ACREAGE	=	18.280
TOTAL NONRES. BLDG.	=	46.000
TOTAL NONRES. BLDG. DESTROYED	=	13.000
TOTAL NONRES. BLDG. DAMAGED	=	19.000
VACANT OR UNIMPROVED ACREAGE	=	4.840
DWELLING UNITS BEFORE FLOOD	=	522.000
UNUSABLE BUT REPARBL(NON-MIN)	=	11.000
UNUSABLE BUT REPARBL(MINORTY)	=	41.000
USABLE(NON-MINORITY)	=	82.000
USABLE(MINORITY)	=	324.000
TOTAL FAMILIES REMAINING	=	166.000
TOTAL NON-MIN FAMILIES	=	54.000
TOTAL MINORITY FAMILIES	=	112.000
PROJECT COST	=	$ 13.315 MILLION.

TABLE D-8
DATA FOR EDWARDSVILLE, LUZERNE

PROJECT NUMBER 8
EDWARDSVILLE, LUZERNE

THERE ARE 9 VARIATIONS FOR THIS PROJECT. THE BUDGET RANGE IS 20.0% TO 100.0%, IN STEPS OF 10.0%.

INPUT DATA(FOR 100% FUNDING):

TOTAL ACRES	=	403.410
TOTAL BLDG. BEFORE DISASTER	=	643.000
TOTAL BLDG. DESTROYED	=	6.000
TOTAL BLDG. DAMAGED	=	526.000
RES. ACREAGE (DWELLING)	=	57.050
RES. ACREAGE (RELATED)	=	3.110
TOTAL RES. BLDG.	=	540.000
TOTAL RES. BLDG. DESTROYED	=	6.000
TOTAL RES. BLDG. DAMAGED	=	520.000
NONRES. ACREAGE	=	234.080
TOTAL NONRES. BLDG.	=	108.000
TOTAL NONRES. BLDG. DESTROYED	=	0.0
TOTAL NONRES. BLDG. DAMAGED	=	106.000
VACANT OR UNIMPROVED ACREAGE	=	75.680
DWELLING UNITS BEFORE FLOOD	=	568.000
UNUSABLE BUT REPAIRBL(NON-MIN)	=	69.000
UNUSABLE BUT REPAIRBL(MINORITY)	=	0.0
USABLE(NON-MINORITY)	=	499.000
USABLE(MINORITY)	=	0.0
TOTAL FAMILIES REMAINING	=	499.000
TOTAL NON-MIN FAMILIES	=	499.000
TOTAL MINORITY FAMILIES	=	0.0
PROJECT COST	=	$ 6.962 MILLION.

TABLE D-9
DATA FOR FORTY FORT, LUZERNE

PROJECT NUMBER 9
FORTY FORT, LUZERNE

THERE ARE 9 VARIATIONS FOR THIS PROJECT. THE BUDGET RANGE IS 20.0% TO 100.0%, IN STEPS OF 10.0%.

INPUT DATA(FOR 100% FUNDING):

TOTAL ACRES	=	450.760
TOTAL BLDG. BEFORE DISASTER	=	2034.000
TOTAL BLDG. DESTROYED	=	210.000
TOTAL BLDG. DAMAGED	=	1494.000
RES. ACREAGE (DWELLING)	=	249.700
RES. ACREAGE (RELATED)	=	30.710
TOTAL RES. BLDG.	=	1960.000
TOTAL RES. BLDG. DESTROYED	=	200.000
TOTAL RES. BLDG. DAMAGED	=	1440.000
NONRES. ACREAGE	=	63.540
TOTAL NONRES. BLDG.	=	74.000
TOTAL NONRES. BLDG. DESTROYED	=	10.000
TOTAL NONRES. BLDG. DAMAGED	=	59.000
VACANT OR UNIMPROVED ACREAGE	=	9.080
DWELLING UNITS BEFORE FLOOD	=	2020.000
UNUSABLE BUT REPARBL(NON-MIN)	=	706.000
UNUSABLE BUT REPARBL(MINORTY)	=	0.0
USABLE(NON-MINORITY)	=	785.000
USABLE(MINORITY)	=	0.0
TOTAL FAMILIES REMAINING	=	1730.000
TOTAL NON-MIN FAMILIES	=	1730.000
TOTAL MINORITY FAMILIES	=	0.0
PROJECT COST	=	$ 12.451 MILLION.

TABLE D-10
DATA FOR HANOVER TWP, LUZERNE

PROJECT NUMBER 10
HANOVER TWP, LUZERNE

THERE ARE 9 VARIATIONS FOR THIS PROJECT. THE BUDGET RANGE IS 20.0% TO 100.0%, IN STEPS OF 10.0%.

INPUT DATA(FOR 100% FUNDING):

TOTAL ACRES	=	391.800
TOTAL BLDG. BEFORE DISASTER	=	755.000
TOTAL BLDG. DESTROYED	=	66.000
TOTAL BLDG. DAMAGED	=	689.000
RES. ACREAGE (DWELLING)	=	92.100
RES. ACREAGE (RELATED)	=	7.500
TOTAL RES. BLDG.	=	715.000
TOTAL RES. BLDG. DESTROYED	=	56.000
TOTAL RES. BLDG. DAMAGED	=	659.000
NONRES. ACREAGE	=	92.200
TOTAL NONRES. BLDG.	=	40.000
TOTAL NONRES. BLDG. DESTROYED	=	10.000
TOTAL NONRES. BLDG. DAMAGED	=	30.000
VACANT OR UNIMPROVED ACREAGE	=	83.500
DWELLING UNITS BEFORE FLOOD	=	835.000
UNUSABLE BUT REPARBL(NON-MIN)	=	25.000
UNUSABLE BUT REPARBL(MINORTY)	=	0.0
USABLE(NON-MINORITY)	=	750.000
USABLE(MINORITY)	=	0.0
TOTAL FAMILIES REMAINING	=	765.000
TOTAL NON-MIN FAMILIES	=	765.000
TOTAL MINORITY FAMILIES	=	0.0
PROJECT COST	=	$ 14.051 MILLION.

TABLE D-11
DATA FOR KINGSTON, LUZERNE

PROJECT NUMBER 11
KINGSTON, LUZERNE

THERE ARE 9 VARIATIONS FOR THIS PROJECT. THE BUDGET RANGE IS 20.0% TO 100.0%, IN STEPS OF 10.0%.

INPUT DATA(FOR 100% FUNDING):

TOTAL ACRES	=	1331.220
TOTAL BLDG. BEFORE DISASTER	=	6629.000
TOTAL BLDG. DESTROYED	=	150.000
TOTAL BLDG. DAMAGED	=	6479.000
RES. ACREAGE (DWELLING)	=	566.750
RES. ACREAGE (RELATED)	=	26.660
TOTAL RES. BLDG.	=	6222.000
TOTAL RES. BLDG. DESTROYED	=	130.000
TOTAL RES. BLDG. DAMAGED	=	6092.000
NONRES. ACREAGE	=	167.870
TOTAL NONRES. BLDG.	=	407.000
TOTAL NONRES. BLDG. DESTROYED	=	20.000
TOTAL NONRES. BLDG. DAMAGED	=	387.000
VACANT OR UNIMPROVED ACREAGE	=	322.000
DWELLING UNITS BEFORE FLOOD	=	6680.000
UNUSABLE BUT REPARBL(NON-MIN)	=	2985.000
UNUSABLE BUT REPARBL(MINORITY)	=	5.000
USABLE(NON-MINORITY)	=	2990.000
USABLE(MINORITY)	=	0.0
TOTAL FAMILIES REMAINING	=	6351.000
TOTAL NON-MIN FAMILIES	=	6346.000
TOTAL MINORITY FAMILIES	=	5.000
PROJECT COST	=	$ 44.850 MILLION.

TABLE D-12
DATA FOR LUZERNE, LUZERNE

PROJECT NUMBER 12
LUZERNE, LUZERNE

THERE ARE 9 VARIATIONS FOR THIS PROJECT. THE BUDGET RANGE IS 20.0% TO 100.0%, IN STEPS OF 10.0%.

INPUT DATA(FOR 100% FUNDING):

TOTAL ACRES	=	58.900
TOTAL BLDG. BEFORE DISASTER	=	279.000
TOTAL BLDG. DESTROYED	=	0.0
TOTAL BLDG. DAMAGED	=	203.000
RES. ACREAGE (DWELLING)	=	32.900
RES. ACREAGE (RELATED)	=	0.0
TOTAL RES. BLDG.	=	255.000
TOTAL RES. BLDG. DESTROYED	=	0.0
TOTAL RES. BLDG. DAMAGED	=	179.000
NONRES. ACREAGE	=	8.900
TOTAL NONRES. BLDG.	=	24.000
TOTAL NONRES. BLDG. DESTROYED	=	0.0
TOTAL NONRES. BLDG. DAMAGED	=	24.000
VACANT OR UNIMPROVED ACREAGE	=	8.000
DWELLING UNITS BEFORE FLOOD	=	280.000
UNUSABLE BUT REPARBL(NON-MIN)	=	40.000
UNUSABLE BUT REPARBL(MINORTY)	=	0.0
USABLE(NON-MINORITY)	=	240.000
USABLE(MINORITY)	=	0.0
TOTAL FAMILIES REMAINING	=	240.000
TOTAL NON-MIN FAMILIES	=	240.000
TOTAL MINORITY FAMILIES	=	0.0
PROJECT COST	=	$ 2.387 MILLION.

TABLE D-13
DATA FOR MOCANAQUA, LUZERNE

PROJECT NUMBER 13
MOCANAQUA, LUZERNE

THERE ARE 9 VARIATIONS FOR THIS PROJECT. THE BUDGET RANGE IS 20.0% TO 100.0%, IN STEPS OF 10.0%.

INPUT DATA(FOR 100% FUNDING):

TOTAL ACRES	=	41.000
TOTAL BLDG. BEFORE DISASTER	=	124.000
TOTAL BLDG. DESTROYED	=	5.000
TOTAL BLDG. DAMAGED	=	110.000
RES. ACREAGE (DWELLING)	=	19.200
RES. ACREAGE (RELATED)	=	0.0
TOTAL RES. BLDG.	=	123.000
TOTAL RES. BLDG. DESTROYED	=	5.000
TOTAL RES. BLDG. DAMAGED	=	109.000
NONRES. ACREAGE	=	1.400
TOTAL NONRES. BLDG.	=	1.000
TOTAL NONRES. BLDG. DESTROYED	=	0.0
TOTAL NONRES. BLDG. DAMAGED	=	1.000
VACANT OR UNIMPROVED ACREAGE	=	9.400
DWELLING UNITS BEFORE FLOOD	=	168.000
UNUSABLE BUT REPARBL(NON-MIN)	=	0.0
UNUSABLE BUT REPARBL(MINORTY)	=	0.0
USABLE(NON-MINORITY)	=	168.000
USABLE(MINORITY)	=	0.0
TOTAL FAMILIES REMAINING	=	168.000
TOTAL NON-MIN FAMILIES	=	168.000
TOTAL MINORITY FAMILIES	=	0.0
PROJECT COST	=	$ 2.719 MILLION.

TABLE D-14
DATA FOR NANTICOKE, LUZERNE

PROJECT NUMBER 14
NANTICOKE, LUZERNE

THERE ARE 9 VARIATIONS FOR THIS PROJECT. THE BUDGET RANGE IS 20.0% TO 100.0%, IN STEPS OF 10.0%.

INPUT DATA(FOR 100% FUNDING):

TOTAL ACRES	=	59.000
TOTAL BLDG. BEFORE DISASTER	=	77.000
TOTAL BLDG. DESTROYED	=	0.0
TOTAL BLDG. DAMAGED	=	75.000
RES. ACREAGE (DWELLING)	=	12.000
RES. ACREAGE (RELATED)	=	0.0
TOTAL RES. BLDG.	=	64.000
TOTAL RES. BLDG. DESTROYED	=	0.0
TOTAL RES. BLDG. DAMAGED	=	62.000
NONRES. ACREAGE	=	16.000
TOTAL NONRES. BLDG.	=	13.000
TOTAL NONRES. BLDG. DESTROYED	=	0.0
TOTAL NONRES. BLDG. DAMAGED	=	13.000
VACANT OR UNIMPROVED ACREAGE	=	21.000
DWELLING UNITS BEFORE FLOOD	=	72.000
UNUSABLE BUT REPARBL(NON-MIN)	=	25.000
UNUSABLE BUT REPARBL(MINORTY)	=	0.0
USABLE(NON-MINORITY)	=	47.000
USABLE(MINORITY)	=	0.0
TOTAL FAMILIES REMAINING	=	30.000
TOTAL NON-MIN FAMILIES	=	30.000
TOTAL MINORITY FAMILIES	=	0.0
PROJECT COST	= $	2.856 MILLION.

TABLE D-15
DATA FOR PLAINS, LUZERNE

PROJECT NUMBER 15
PLAINS, LUZERNE

THERE ARE 9 VARIATIONS FOR THIS PROJECT. THE BUDGET RANGE IS 20.0% TO 100.0%, IN STEPS OF 10.0%.

INPUT DATA(FOR 100% FUNDING):

TOTAL ACRES	=	62.840
TOTAL BLDG. BEFORE DISASTER	=	100.000
TOTAL BLDG. DESTROYED	=	19.000
TOTAL BLDG. DAMAGED	=	68.000
RES. ACREAGE (DWELLING)	=	15.140
RES. ACREAGE (RELATED)	=	0.0
TOTAL RES. BLDG.	=	90.000
TOTAL RES. BLDG. DESTROYED	=	17.000
TOTAL RES. BLDG. DAMAGED	=	61.000
NONRES. ACREAGE	=	27.410
TOTAL NONRES. BLDG.	=	10.000
TOTAL NONRES. BLDG. DESTROYED	=	2.000
TOTAL NONRES. BLDG. DAMAGED	=	7.000
VACANT OR UNIMPROVED ACREAGE	=	13.080
DWELLING UNITS BEFORE FLOOD	=	99.000
UNUSABLE BUT REPARBL(NON-MIN)	=	17.000
UNUSABLE BUT REPARBL(MINORITY)	=	0.0
USABLE(NON-MINORITY)	=	63.000
USABLE(MINORITY)	=	0.0
TOTAL FAMILIES REMAINING	=	94.000
TOTAL NON-MIN FAMILIES	=	94.000
TOTAL MINORITY FAMILIES	=	0.0
PROJECT COST	=	$ 1.849 MILLION.

TABLE D-16
DATA FOR PLYMOUTH BORO, LUZERNE

PROJECT NUMBER 16
PLYMOUTH BORO, LUZERNE

THERE ARE 9 VARIATIONS FOR THIS PROJECT. THE BUDGET RANGE IS 20.0% TO 100.0%, IN STEPS OF 10.0%.

INPUT DATA(FOR 100% FUNDING):

TOTAL ACRES	=	303.100
TOTAL BLDG. BEFORE DISASTER	=	1620.000
TOTAL BLDG. DESTROYED	=	20.000
TOTAL BLDG. DAMAGED	=	1179.000
RES. ACREAGE (DWELLING)	=	118.800
RES. ACREAGE (RELATED)	=	11.500
TOTAL RES. BLDG.	=	1510.000
TOTAL RES. BLDG. DESTROYED	=	15.000
TOTAL RES. BLDG. DAMAGED	=	1093.000
NONRES. ACREAGE	=	29.100
TOTAL NONRES. BLDG.	=	101.000
TOTAL NONRES. BLDG. DESTROYED	=	5.000
TOTAL NONRES. BLDG. DAMAGED	=	86.000
VACANT OR UNIMPROVED ACREAGE	=	87.600
DWELLING UNITS BEFORE FLOOD	=	1700.000
UNUSABLE BUT REPARBL(NON-MIN)	=	11.000
UNUSABLE BUT REPARBL(MINORTY)	=	0.0
USABLE(NON-MINORITY)	=	1550.000
USABLE(MINORITY)	=	0.0
TOTAL FAMILIES REMAINING	=	1550.000
TOTAL NON-MIN FAMILIES	=	1550.000
TOTAL MINORITY FAMILIES	=	0.0
PROJECT COST	=	$ 14.094 MILLION.

TABLE D-17
DATA FOR PLYMOUTH TWP, LUZERNE

PROJECT NUMBER 17
PLYMOUTH TWP, LUZERNE

THERE ARE 9 VARIATIONS FOR THIS PROJECT. THE BUDGET RANGE IS 20.0% TO 100.0%, IN STEPS OF 10.0%.

INPUT DATA(FOR 100% FUNDING):

TOTAL ACRES	=	49.300
TOTAL BLDG. BEFORE DISASTER	=	52.000
TOTAL BLDG. DESTROYED	=	4.000
TOTAL BLDG. DAMAGED	=	46.000
RES. ACREAGE (DWELLING)	=	15.500
RES. ACREAGE (RELATED)	=	0.0
TOTAL RES. BLDG.	=	47.000
TOTAL RES. BLDG. DESTROYED	=	2.000
TOTAL RES. BLDG. DAMAGED	=	43.000
NONRES. ACREAGE	=	10.800
TOTAL NONRES. BLDG.	=	5.000
TOTAL NONRES. BLDG. DESTROYED	=	2.000
TOTAL NONRES. BLDG. DAMAGED	=	3.000
VACANT OR UNIMPROVED ACREAGE	=	16.000
DWELLING UNITS BEFORE FLOOD	=	54.000
UNUSABLE BUT REPARBL(NON-MIN)	=	8.000
UNUSABLE BUT REPARBL(MINORTY)	=	0.0
USABLE(NON-MINORITY)	=	44.000
USABLE(MINORITY)	=	0.0
TOTAL FAMILIES REMAINING	=	30.000
TOTAL NON-MIN FAMILIES	=	30.000
TOTAL MINORITY FAMILIES	=	0.0
PROJECT COST	= $	2.200 MILLION.

TABLE D-18
DATA FOR SHICKSHINNY, LUZERNE

PROJECT NUMBER 18
SHICKSHINNY, LUZERNE

THERE ARE 9 VARIATIONS FOR THIS PROJECT. THE BUDGET RANGE IS 20.0% TO 100.0%, IN STEPS OF 10.0%.

INPUT DATA(FOR 100% FUNDING):

TOTAL ACRES	=	197.300
TOTAL BLDG. BEFORE DISASTER	=	372.000
TOTAL BLDG. DESTROYED	=	12.000
TOTAL BLDG. DAMAGED	=	337.000
RES. ACREAGE (DWELLING)	=	144.200
RES. ACREAGE (RELATED)	=	0.500
TOTAL RES. BLDG.	=	340.000
TOTAL RES. BLDG. DESTROYED	=	9.000
TOTAL RES. BLDG. DAMAGED	=	316.000
NONRES. ACREAGE	=	14.000
TOTAL NONRES. BLDG.	=	32.000
TOTAL NONRES. BLDG. DESTROYED	=	3.000
TOTAL NONRES. BLDG. DAMAGED	=	21.000
VACANT OR UNIMPROVED ACREAGE	=	10.200
DWELLING UNITS BEFORE FLOOD	=	352.000
UNUSABLE BUT REPARBL(NON-MIN)	=	58.000
UNUSABLE BUT REPARBL(MINORTY)	=	0.0
USABLE(NON-MINORITY)	=	235.000
USABLE(MINORITY)	=	0.0
TOTAL FAMILIES REMAINING	=	235.000
TOTAL NON-MIN FAMILIES	=	235.000
TOTAL MINORITY FAMILIES	=	0.0
PROJECT COST	=	$ 5.439 MILLION.

TABLE D-19
DATA FOR SWOYERSVILLE, LUZERNE

PROJECT NUMBER 19
SWOYERSVILLE, LUZERNE

THERE ARE 9 VARIATIONS FOR THIS PROJECT. THE BUDGET RANGE IS 20.0% TO 100.0%, IN STEPS OF 10.0%.

INPUT DATA(FOR 100% FUNDING):

TOTAL ACRES	=	711.200
TOTAL BLDG. BEFORE DISASTER	=	1857.000
TOTAL BLDG. DESTROYED	=	35.000
TOTAL BLDG. DAMAGED	=	1636.000
RES. ACREAGE (DWELLING)	=	461.300
RES. ACREAGE (RELATED)	=	10.400
TOTAL RES. BLDG.	=	1795.000
TOTAL RES. BLDG. DESTROYED	=	31.000
TOTAL RES. BLDG. DAMAGED	=	1580.000
NONRES. ACREAGE	=	36.900
TOTAL NONRES. BLDG.	=	62.000
TOTAL NONRES. BLDG. DESTROYED	=	4.000
TOTAL NONRES. BLDG. DAMAGED	=	56.000
VACANT OR UNIMPROVED ACREAGE	=	93.200
DWELLING UNITS BEFORE FLOOD	=	1820.000
UNUSABLE BUT REPARBL(NON-MIN)	=	124.000
UNUSABLE BUT REPARBL(MINORTY)	=	0.0
USABLE(NON-MINORITY)	=	1665.000
USABLE(MINORITY)	=	0.0
TOTAL FAMILIES REMAINING	=	1665.000
TOTAL NON-MIN FAMILIES	=	1665.000
TOTAL MINORITY FAMILIES	=	0.0
PROJECT COST	=	$ 17.396 MILLION.

TABLE D-20
DATA FOR WEST NANTICOKE, LUZERNE

PROJECT NUMBER 20
WEST NANTICOKE, LUZERNE

THERE ARE 9 VARIATIONS FOR THIS PROJECT. THE BUDGET RANGE IS 20.0% TO 100.0%, IN STEPS OF 10.0%.

INPUT DATA(FOR 100% FUNDING):

TOTAL ACRES	=	106.400
TOTAL BLDG. BEFORE DISASTER	=	236.000
TOTAL BLDG. DESTROYED	=	6.000
TOTAL BLDG. DAMAGED	=	216.000
RES. ACREAGE (DWELLING)	=	51.200
RES. ACREAGE (RELATED)	=	1.500
TOTAL RES. BLDG.	=	207.000
TOTAL RES. BLDG. DESTROYED	=	5.000
TOTAL RES. BLDG. DAMAGED	=	188.000
NONRES. ACREAGE	=	20.800
TOTAL NONRES. BLDG.	=	29.000
TOTAL NONRES. BLDG. DESTROYED	=	1.000
TOTAL NONRES. BLDG. DAMAGED	=	28.000
VACANT OR UNIMPROVED ACREAGE	=	14.200
DWELLING UNITS BEFORE FLOOD	=	222.000
UNUSABLE BUT REPARBL(NON-MIN)	=	30.000
UNUSABLE BUT REPARBL(MINORTY)	=	0.0
USABLE(NON-MINORITY)	=	192.000
USABLE(MINORITY)	=	0.0
TOTAL FAMILIES REMAINING	=	192.000
TOTAL NON-MIN FAMILIES	=	192.000
TOTAL MINORITY FAMILIES	=	0.0
PROJECT COST	=	$ 6.241 MILLION.

TABLE D-21
DATA FOR WEST PITTSTON, LUZERNE

PROJECT NUMBER 21
WEST PITTSTON, LUZERNE

THERE ARE 9 VARIATIONS FOR THIS PROJECT. THE BUDGET RANGE IS 20.0% TO 100.0%, IN STEPS OF 10.0%.

INPUT DATA(FOR 100% FUNDING):

TOTAL ACRES	=	170.380
TOTAL BLDG. BEFORE DISASTER	=	625.000
TOTAL BLDG. DESTROYED	=	50.000
TOTAL BLDG. DAMAGED	=	490.000
RES. ACREAGE (DWELLING)	=	104.100
RES. ACREAGE (RELATED)	=	0.300
TOTAL RES. BLDG.	=	606.000
TOTAL RES. BLDG. DESTROYED	=	45.000
TOTAL RES. BLDG. DAMAGED	=	476.000
NONRES. ACREAGE	=	6.680
TOTAL NONRES. BLDG.	=	19.000
TOTAL NONRES. BLDG. DESTROYED	=	5.000
TOTAL NONRES. BLDG. DAMAGED	=	14.000
VACANT OR UNIMPROVED ACREAGE	=	18.300
DWELLING UNITS BEFORE FLOOD	=	700.000
UNUSABLE BUT REPARBL(NON-MIN)	=	270.000
UNUSABLE BUT REPARBL(MINORTY)	=	0.0
USABLE(NON-MINORITY)	=	355.000
USABLE(MINORITY)	=	0.0
TOTAL FAMILIES REMAINING	=	685.000
TOTAL NON-MIN FAMILIES	=	685.000
TOTAL MINORITY FAMILIES	=	0.0
PROJECT COST	=	$ 4.453 MILLION.

TABLE D-22
DATA FOR WEST WYOMING, LUZERNE

PROJECT NUMBER 22
WEST WYOMING, LUZERNE

THERE ARE 9 VARIATIONS FOR THIS PROJECT. THE BUDGET RANGE IS 20.0% TO 100.0%, IN STEPS OF 10.0%.

INPUT DATA(FOR 100% FUNDING):

TOTAL ACRES	=	5.250
TOTAL BLDG. BEFORE DISASTER	=	12.000
TOTAL BLDG. DESTROYED	=	8.000
TOTAL BLDG. DAMAGED	=	4.000
RES. ACREAGE (DWELLING)	=	2.860
RES. ACREAGE (RELATED)	=	0.0
TOTAL RES. BLDG.	=	12.000
TOTAL RES. BLDG. DESTROYED	=	8.000
TOTAL RES. BLDG. DAMAGED	=	4.000
NONRES. ACREAGE	=	0.0
TOTAL NONRES. BLDG.	=	0.0
TOTAL NONRES. BLDG. DESTROYED	=	0.0
TOTAL NONRES. BLDG. DAMAGED	=	0.0
VACANT OR UNIMPROVED ACREAGE	=	1.200
DWELLING UNITS BEFORE FLOOD	=	12.000
UNUSABLE BUT REPARBL(NON-MIN)	=	2.000
UNUSABLE BUT REPARBL(MINORTY)	=	0.0
USABLE(NON-MINORITY)	=	2.000
USABLE(MINORITY)	=	0.0
TOTAL FAMILIES REMAINING	=	2.000
TOTAL NON-MIN FAMILIES	=	2.000
TOTAL MINORITY FAMILIES	=	0.0
PROJECT COST	= $	0.970 MILLION.

TABLE D-23
DATA FOR WILKES-BARRE (DOWN-TOWN), LUZERNE

PROJECT NUMBER 23
WILKES-BARRE(DOWN-TOWN), LUZERNE

THERE ARE 9 VARIATIONS FOR THIS PROJECT. THE BUDGET RANGE IS 20.0% TO 100.0%, IN STEPS OF 10.0%.

INPUT DATA(FOR 100% FUNDING):

TOTAL ACRES	=	200.550
TOTAL BLDG. BEFORE DISASTER	=	758.000
TOTAL BLDG. DESTROYED	=	237.000
TOTAL BLDG. DAMAGED	=	521.000
RES. ACREAGE (DWELLING)	=	61.210
RES. ACREAGE (RELATED)	=	23.200
TOTAL RES. BLDG.	=	478.000
TOTAL RES. BLDG. DESTROYED	=	142.000
TOTAL RES. BLDG. DAMAGED	=	336.000
NONRES. ACREAGE	=	83.960
TOTAL NONRES. BLDG.	=	280.000
TOTAL NONRES. BLDG. DESTROYED	=	95.000
TOTAL NONRES. BLDG. DAMAGED	=	185.000
VACANT OR UNIMPROVED ACREAGE	=	10.040
DWELLING UNITS BEFORE FLOOD	=	1899.000
UNUSABLE BUT REPARBL(NON-MIN)	=	1177.000
UNUSABLE BUT REPARBL(MINORTY)	=	40.000
USABLE(NON-MINORITY)	=	455.000
USABLE(MINORITY)	=	17.000
TOTAL FAMILIES REMAINING	=	510.000
TOTAL NON-MIN FAMILIES	=	500.000
TOTAL MINORITY FAMILIES	=	10.000
PROJECT COST	=	$ 65.813 MILLION.

TABLE D-24
DATA FOR WILKES-BARRE (IRON TRIANGLE), LUZERNE

PROJECT NUMBER 24
WILKES-BARRE(IRON TRIANGLE), LUZERNE

THERE ARE 9 VARIATIONS FOR THIS PROJECT. THE BUDGET RANGE IS 20.0% TO 100.0%, IN STEPS OF 10.0%.

INPUT DATA(FOR 100% FUNDING):

TOTAL ACRES	=	15.630
TOTAL BLDG. BEFORE DISASTER	=	155.000
TOTAL BLDG. DESTROYED	=	74.000
TOTAL BLDG. DAMAGED	=	31.000
RES. ACREAGE (DWELLING)	=	8.900
RES. ACREAGE (RELATED)	=	0.120
TOTAL RES. BLDG.	=	134.000
TOTAL RES. BLDG. DESTROYED	=	61.000
TOTAL RES. BLDG. DAMAGED	=	28.000
NONRES. ACREAGE	=	2.020
TOTAL NONRES. BLDG.	=	21.000
TOTAL NONRES. BLDG. DESTROYED	=	13.000
TOTAL NONRES. BLDG. DAMAGED	=	3.000
VACANT OR UNIMPROVED ACREAGE	=	0.0
DWELLING UNITS BEFORE FLOOD	=	154.000
UNUSABLE BUT REPARBL(NON-MIN)	=	16.000
UNUSABLE BUT REPARBL(MINORTY)	=	4.000
USABLE(NON-MINORITY)	=	39.000
USABLE(MINORITY)	=	15.000
TOTAL FAMILIES REMAINING	=	74.000
TOTAL NON-MIN FAMILIES	=	55.000
TOTAL MINORITY FAMILIES	=	19.000
PROJECT COST	=	$ 5.800 MILLION.

TABLE D-25
DATA FOR WILKES-BARRE (SOUTH, LUZERNE

PROJECT NUMBER 25
WILKES-BARRE(SOUTH), LUZERNE

THERE ARE 9 VARIATIONS FOR THIS PROJECT. THE BUDGET RANGE IS 20.0% TO 100.0%, IN STEPS OF 10.0%.

INPUT DATA(FOR 100% FUNDING):

TOTAL ACRES	=	983.700
TOTAL BLDG. BEFORE DISASTER	=	3664.000
TOTAL BLDG. DESTROYED	=	70.000
TOTAL BLDG. DAMAGED	=	3105.000
RES. ACREAGE (DWELLING)	=	441.200
RES. ACREAGE (RELATED)	=	0.0
TOTAL RES. BLDG.	=	3629.000
TOTAL RES. BLDG. DESTROYED	=	70.000
TOTAL RES. BLDG. DAMAGED	=	3070.000
NONRES. ACREAGE	=	77.500
TOTAL NONRES. BLDG.	=	35.000
TOTAL NONRES. BLDG. DESTROYED	=	0.0
TOTAL NONRES. BLDG. DAMAGED	=	35.000
VACANT OR UNIMPROVED ACREAGE	=	244.700
DWELLING UNITS BEFORE FLOOD	=	3629.000
UNUSABLE BUT REPARBL(NON-MIN)	=	255.000
UNUSABLE BUT REPARBL(MINORTY)	=	13.000
USABLE(NON-MINORITY)	=	2704.000
USABLE(MINORITY)	=	142.000
TOTAL FAMILIES REMAINING	=	2246.000
TOTAL NON-MIN FAMILIES	=	2134.000
TOTAL MINORITY FAMILIES	=	112.000
PROJECT COST	=	$ 44.799 MILLION.

TABLE D-26
DATA FOR WYOMING, LUZERNE

PROJECT NUMBER 26
WYOMING, LUZERNE

THERE ARE 9 VARIATIONS FOR THIS PROJECT. THE BUDGET RANGE IS 20.0% TO 100.0%, IN STEPS OF 10.0%.

INPUT DATA(FOR 100% FUNDING):

TOTAL ACRES	=	170.300
TOTAL BLDG. BEFORE DISASTER	=	64.000
TOTAL BLDG. DESTROYED	=	22.000
TOTAL BLDG. DAMAGED	=	29.000
RES. ACREAGE (DWELLING)	=	29.200
RES. ACREAGE (RELATED)	=	0.0
TOTAL RES. BLDG.	=	35.000
TOTAL RES. BLDG. DESTROYED	=	19.000
TOTAL RES. BLDG. DAMAGED	=	3.000
NONRES. ACREAGE	=	64.400
TOTAL NONRES. BLDG.	=	29.000
TOTAL NONRES. BLDG. DESTROYED	=	3.000
TOTAL NONRES. BLDG. DAMAGED	=	26.000
VACANT OR UNIMPROVED ACREAGE	=	67.400
DWELLING UNITS BEFORE FLOOD	=	35.000
UNUSABLE BUT REPARBL(NON-MIN)	=	3.000
UNUSABLE BUT REPARBL(MINORTY)	=	0.0
USABLE(NON-MINORITY)	=	13.000
USABLE(MINORITY)	=	0.0
TOTAL FAMILIES REMAINING	=	35.000
TOTAL NON-MIN FAMILIES	=	35.000
TOTAL MINORITY FAMILIES	=	0.0
PROJECT COST	=	$ 1.931 MILLION.

TABLE D-27
DATA FOR SCHUYLKILL HAVEN, SCHUYLKILL

PROJECT NUMBER 27
SCHUYLKILL HAVEN, SCHUYLKILL

THERE ARE 9 VARIATIONS FOR THIS PROJECT. THE BUDGET RANGE IS 20.0% TO 100.0%, IN STEPS OF 10.0%.

INPUT DATA(FOR 100% FUNDING):

TOTAL ACRES	=	19.900
TOTAL BLDG. BEFORE DISASTER	=	75.000
TOTAL BLDG. DESTROYED	=	0.0
TOTAL BLDG. DAMAGED	=	68.000
RES. ACREAGE (DWELLING)	=	7.800
RES. ACREAGE (RELATED)	=	0.200
TOTAL RES. BLDG.	=	63.000
TOTAL RES. BLDG. DESTROYED	=	0.0
TOTAL RES. BLDG. DAMAGED	=	56.000
NONRES. ACREAGE	=	3.100
TOTAL NONRES. BLDG.	=	12.000
TOTAL NONRES. BLDG. DESTROYED	=	0.0
TOTAL NONRES. BLDG. DAMAGED	=	12.000
VACANT OR UNIMPROVED ACREAGE	=	3.800
DWELLING UNITS BEFORE FLOOD	=	112.000
UNUSABLE BUT REPARBL(NON-MIN)	=	28.000
UNUSABLE BUT REPARBL(MINORTY)	=	0.0
USABLE(NON-MINORITY)	=	84.000
USABLE(MINORITY)	=	0.0
TOTAL FAMILIES REMAINING	=	105.000
TOTAL NON-MIN FAMILIES	=	105.000
TOTAL MINORITY FAMILIES	=	0.0
PROJECT COST	=	$ 2.076 MILLION.

TABLE D-28
DATA FOR ATHENS BORO, BRADFORD

PROJECT NUMBER 28
ATHENS BORO, BRADFORD

THERE ARE 9 VARIATIONS FOR THIS PROJECT. THE BUDGET RANGE IS 20.0% TO 100.0%, IN STEPS OF 10.0%.

INPUT DATA(FOR 100% FUNDING):

TOTAL ACRES	=	628.900
TOTAL BLDG. BEFORE DISASTER	=	855.000
TOTAL BLDG. DESTROYED	=	16.000
TOTAL BLDG. DAMAGED	=	796.000
RES. ACREAGE (DWELLING)	=	355.100
RES. ACREAGE (RELATED)	=	4.900
TOTAL RES. BLDG.	=	787.000
TOTAL RES. BLDG. DESTROYED	=	16.000
TOTAL RES. BLDG. DAMAGED	=	728.000
NONRES. ACREAGE	=	68.000
TOTAL NONRES. BLDG.	=	68.000
TOTAL NONRES. BLDG. DESTROYED	=	0.0
TOTAL NONRES. BLDG. DAMAGED	=	68.000
VACANT OR UNIMPROVED ACREAGE	=	119.000
DWELLING UNITS BEFORE FLOOD	=	850.000
UNUSABLE BUT REPARBL(NON-MIN)	=	197.000
UNUSABLE BUT REPARBL(MINORTY)	=	3.000
USABLE(NON-MINORITY)	=	650.000
USABLE(MINORITY)	=	0.0
TOTAL FAMILIES REMAINING	=	840.000
TOTAL NON-MIN FAMILIES	=	837.000
TOTAL MINORITY FAMILIES	=	3.000
PROJECT COST	=	$ 10.227 MILLION.

TABLE D-29
DATA FOR MONROETON, BRADFORD

PROJECT NUMBER 29
MONROETON, BRADFORD

THERE ARE 9 VARIATIONS FOR THIS PROJECT. THE BUDGET RANGE IS 20.0% TO 100.0%, IN STEPS OF 10.0%.

INPUT DATA(FOR 100% FUNDING):

TOTAL ACRES	=	143.660
TOTAL BLDG. BEFORE DISASTER	=	188.000
TOTAL BLDG. DESTROYED	=	3.000
TOTAL BLDG. DAMAGED	=	185.000
RES. ACREAGE (DWELLING)	=	77.560
RES. ACREAGE (RELATED)	=	2.060
TOTAL RES. BLDG.	=	173.000
TOTAL RES. BLDG. DESTROYED	=	3.000
TOTAL RES. BLDG. DAMAGED	=	170.000
NONRES. ACREAGE	=	14.750
TOTAL NONRES. BLDG.	=	15.000
TOTAL NONRES. BLDG. DESTROYED	=	0.0
TOTAL NONRES. BLDG. DAMAGED	=	15.000
VACANT OR UNIMPROVED ACREAGE	=	31.860
DWELLING UNITS BEFORE FLOOD	=	190.000
UNUSABLE BUT REPARBL(NON-MIN)	=	15.000
UNUSABLE BUT REPARBL(MINORTY)	=	0.0
USABLE(NON-MINORITY)	=	171.000
USABLE(MINORITY)	=	0.0
TOTAL FAMILIES REMAINING	=	185.000
TOTAL NON-MIN FAMILIES	=	185.000
TOTAL MINORITY FAMILIES	=	0.0
PROJECT COST	=	$ 3.542 MILLION.

TABLE D-30
DATA FOR POWELL, BRADFORD

PROJECT NUMBER 30
POWELL, BRADFORD

THERE ARE 9 VARIATIONS FOR THIS PROJECT. THE BUDGET RANGE IS 20.0% TO 100.0%, IN STEPS OF 10.0%.

INPUT DATA(FOR 100% FUNDING):

TOTAL ACRES	=	59.420
TOTAL BLDG. BEFORE DISASTER	=	66.000
TOTAL BLDG. DESTROYED	=	0.0
TOTAL BLDG. DAMAGED	=	66.000
RES. ACREAGE (DWELLING)	=	44.280
RES. ACREAGE (RELATED)	=	0.350
TOTAL RES. BLDG.	=	64.000
TOTAL RES. BLDG. DESTROYED	=	0.0
TOTAL RES. BLDG. DAMAGED	=	64.000
NONRES. ACREAGE	=	0.490
TOTAL NONRES. BLDG.	=	1.000
TOTAL NONRES. BLDG. DESTROYED	=	0.0
TOTAL NONRES. BLDG. DAMAGED	=	1.000
VACANT OR UNIMPROVED ACREAGE	=	7.600
DWELLING UNITS BEFORE FLOOD	=	64.000
UNUSABLE BUT REPARBL(NON-MIN)	=	20.000
UNUSABLE BUT REPARBL(MINORTY)	=	0.0
USABLE(NON-MINORITY)	=	43.000
USABLE(MINORITY)	=	0.0
TOTAL FAMILIES REMAINING	=	63.000
TOTAL NON-MIN FAMILIES	=	63.000
TOTAL MINORITY FAMILIES	=	0.0
PROJECT COST	=	$ 1.355 MILLION.

TABLE D-31
DATA FOR TOWANDA, BRADFORD

PROJECT NUMBER 31
TOWANDA, BRADFORD

THERE ARE 9 VARIATIONS FOR THIS PROJECT. THE BUDGET RANGE IS 20.0% TO 100.0%, IN STEPS OF 10.0%.

INPUT DATA(FOR 100% FUNDING):

TOTAL ACRES	=	55.320
TOTAL BLDG. BEFORE DISASTER	=	152.000
TOTAL BLDG. DESTROYED	=	0.0
TOTAL BLDG. DAMAGED	=	131.000
RES. ACREAGE (DWELLING)	=	14.160
RES. ACREAGE (RELATED)	=	1.320
TOTAL RES. BLDG.	=	110.000
TOTAL RES. BLDG. DESTROYED	=	0.0
TOTAL RES. BLDG. DAMAGED	=	94.000
NONRES. ACREAGE	=	13.390
TOTAL NONRES. BLDG.	=	42.000
TOTAL NONRES. BLDG. DESTROYED	=	0.0
TOTAL NONRES. BLDG. DAMAGED	=	37.000
VACANT OR UNIMPROVED ACREAGE	=	2.760
DWELLING UNITS BEFORE FLOOD	=	130.000
UNUSABLE BUT REPARBL(NON-MIN)	=	40.000
UNUSABLE BUT REPARBL(MINORTY)	=	0.0
USABLE(NON-MINORITY)	=	90.000
USABLE(MINORITY)	=	0.0
TOTAL FAMILIES REMAINING	=	125.000
TOTAL NON-MIN FAMILIES	=	125.000
TOTAL MINORITY FAMILIES	=	0.0
PROJECT COST	=	$ 4.254 MILLION.

TABLE D-32
DATA FOR BLOSSBURG, TIOGA

PROJECT NUMBER 32
BLOSSBURG, TIOGA

THERE ARE 9 VARIATIONS FOR THIS PROJECT. THE BUDGET RANGE IS 20.0% TO 100.0%, IN STEPS OF 10.0%.

INPUT DATA(FOR 100% FUNDING):

TOTAL ACRES	=	3.090
TOTAL BLDG. BEFORE DISASTER	=	15.000
TOTAL BLDG. DESTROYED	=	0.0
TOTAL BLDG. DAMAGED	=	15.000
RES. ACREAGE (DWELLING)	=	2.060
RES. ACREAGE (RELATED)	=	0.0
TOTAL RES. BLDG.	=	15.000
TOTAL RES. BLDG. DESTROYED	=	0.0
TOTAL RES. BLDG. DAMAGED	=	15.000
NONRES. ACREAGE	=	0.0
TOTAL NONRES. BLDG.	=	0.0
TOTAL NONRES. BLDG. DESTROYED	=	0.0
TOTAL NONRES. BLDG. DAMAGED	=	0.0
VACANT OR UNIMPROVED ACREAGE	=	0.120
DWELLING UNITS BEFORE FLOOD	=	15.000
UNUSABLE BUT REPARBL(NON-MIN)	=	5.000
UNUSAPLE BUT REPARBL(MINORTY)	=	0.0
USABLE(NON-MINORITY)	=	10.000
USABLE(MINORITY)	=	0.0
TOTAL FAMILIES REMAINING	=	3.000
TOTAL NON-MIN FAMILIES	=	3.000
TOTAL MINORITY FAMILIES	=	0.0
PROJECT COST	= $	0.794 MILLION.

TABLE D-33
DATA FOR LAWRENCEVILLE, TIOGA

PROJECT NUMBER 33
LAWRENCEVILLE, TIOGA

THERE ARE 9 VARIATIONS FOR THIS PROJECT. THE BUDGET RANGE IS 20.0% TO 100.0%, IN STEPS OF 10.0%.

INPUT DATA(FOR 100% FUNDING):

TOTAL ACRES	=	86.400
TOTAL BLDG. BEFORE DISASTER	=	154.000
TOTAL BLDG. DESTROYED	=	4.000
TOTAL BLDG. DAMAGED	=	150.000
RES. ACREAGE (DWELLING)	=	54.600
RES. ACREAGE (RELATED)	=	0.400
TOTAL RES. BLDG.	=	133.000
TOTAL RES. BLDG. DESTROYED	=	4.000
TOTAL RES. BLDG. DAMAGED	=	129.000
NONRES. ACREAGE	=	6.830
TOTAL NONRES. BLDG.	=	21.000
TOTAL NONRES. BLDG. DESTROYED	=	0.0
TOTAL NONRES. BLDG. DAMAGED	=	21.000
VACANT OR UNIMPROVED ACREAGE	=	11.990
DWELLING UNITS BEFORE FLOOD	=	135.000
UNUSABLE BUT REPARBL(NON-MIN)	=	17.000
UNUSABLE BUT REPARBL(MINORTY)	=	0.0
USABLE(NON-MINORITY)	=	104.000
USABLE(MINORITY)	=	0.0
TOTAL FAMILIES REMAINING	=	104.000
TOTAL NON-MIN FAMILIES	=	104.000
TOTAL MINORITY FAMILIES	=	0.0
PROJECT COST	=	$ 3.365 MILLION.

TABLE D-34
DATA FOR TIOGA BORO, TIOGA

PROJECT NUMBER 34
TIOGA BORO, TIOGA

THERE ARE 9 VARIATIONS FOR THIS PROJECT. THE BUDGET RANGE IS 20.0% TO 100.0%, IN STEPS OF 10.0%.

INPUT DATA(FOR 100% FUNDING):

TOTAL ACRES	=	22.530
TOTAL BLDG. BEFORE DISASTER	=	66.000
TOTAL BLDG. DESTROYED	=	0.0
TOTAL BLDG. DAMAGED	=	66.000
RES. ACREAGE (DWELLING)	=	12.880
RES. ACREAGE (RELATED)	=	0.390
TOTAL RES. BLDG.	=	57.000
TOTAL RES. BLDG. DESTROYED	=	0.0
TOTAL RES. BLDG. DAMAGED	=	57.000
NONRES. ACREAGE	=	2.230
TOTAL NONRES. BLDG.	=	9.000
TOTAL NONRES. BLDG. DESTROYED	=	0.0
TOTAL NONRES. BLDG. DAMAGED	=	9.000
VACANT OR UNIMPROVED ACREAGE	=	2.170
DWELLING UNITS BEFORE FLOOD	=	58.000
UNUSABLE BUT REPARBL(NON-MIN)	=	0.0
UNUSABLE BUT REPARBL(MINORTY)	=	0.0
USABLE(NON-MINORITY)	=	58.000
USABLE(MINORITY)	=	0.0
TOTAL FAMILIES REMAINING	=	58.000
TOTAL NON-MIN FAMILIES	=	58.000
TOTAL MINORITY FAMILIES	=	0.0
PROJECT COST	= $	1.462 MILLION.

TABLE D-35
DATA FOR MESHOPPEN, WYOMING

PROJECT NUMBER 35
MESHOPPEN, WYOMING

THERE ARE 9 VARIATIONS FOR THIS PROJECT. THE BUDGET RANGE IS 20.0% TO 100.0%, IN STEPS OF 10.0%.

INPUT DATA(FOR 100% FUNDING):

TOTAL ACRES	=	52.200
TOTAL BLDG. BEFORE DISASTER	=	78.000
TOTAL BLDG. DESTROYED	=	9.000
TOTAL BLDG. DAMAGED	=	64.000
RES. ACREAGE (DWELLING)	=	11.700
RES. ACREAGE (RELATED)	=	0.900
TOTAL RES. BLDG.	=	54.000
TOTAL RES. BLDG. DESTROYED	=	7.000
TOTAL RES. BLDG. DAMAGED	=	42.000
NONRES. ACREAGE	=	11.800
TOTAL NONRES. BLDG.	=	24.000
TOTAL NONRES. BLDG. DESTROYED	=	2.000
TOTAL NONRES. BLDG. DAMAGED	=	22.000
VACANT OR UNIMPROVED ACREAGE	=	14.400
DWELLING UNITS BEFORE FLOOD	=	60.000
UNUSABLE BUT REPARBL(NON-MIN)	=	14.000
UNUSABLE BUT REPARBL(MINORTY)	=	0.0
USABLE(NON-MINORITY)	=	46.000
USABLE(MINORITY)	=	0.0
TOTAL FAMILIES REMAINING	=	40.000
TOTAL NON-MIN FAMILIES	=	40.000
TOTAL MINORITY FAMILIES	=	0.0
PROJECT COST	=	$ 1.950 MILLION.

TABLE D-36
DATA FOR TUNKHANNOCK TWP, WYOMING

PROJECT NUMBER 36
TUNKHANNOCK TWP, WYOMING

THERE ARE 9 VARIATIONS FOR THIS PROJECT. THE BUDGET RANGE IS 20.0% TO 100.0%, IN STEPS OF 10.0%.

INPUT DATA(FOR 100% FUNDING):

TOTAL ACRES	=	70.280
TOTAL BLDG. BEFORE DISASTER	=	131.000
TOTAL BLDG. DESTROYED	=	1.000
TOTAL BLDG. DAMAGED	=	120.000
RES. ACREAGE (DWELLING)	=	23.340
RES. ACREAGE (RELATED)	=	1.940
TOTAL RES. BLDG.	=	71.000
TOTAL RES. BLDG. DESTROYED	=	1.000
TOTAL RES. BLDG. DAMAGED	=	69.000
NONRES. ACREAGE	=	26.390
TOTAL NONRES. BLDG.	=	60.000
TOTAL NONRES. BLDG. DESTROYED	=	0.0
TOTAL NONRES. BLDG. DAMAGED	=	51.000
VACANT OR UNIMPROVED ACREAGE	=	4.800
DWELLING UNITS BEFORE FLOOD	=	97.000
UNUSABLE BUT REPARBL(NON-MIN)	=	17.000
UNUSABLE BUT REPARBL(MINORTY)	=	0.0
USABLE(NON-MINORITY)	=	80.000
USABLE(MINORITY)	=	0.0
TOTAL FAMILIES REMAINING	=	80.000
TOTAL NON-MIN FAMILIES	=	80.000
TOTAL MINORITY FAMILIES	=	0.0
PROJECT COST	=	$ 2.699 MILLION.

TABLE D-37
DATA FOR WEST FALLS, WYOMING

PROJECT NUMBER 37
WEST FALLS, WYOMING

THERE ARE 9 VARIATIONS FOR THIS PROJECT. THE BUDGET RANGE IS 20.0% TO 100.0%, IN STEPS OF 10.0%.

INPUT DATA(FOR 100% FUNDING):

TOTAL ACRES	=	220.000
TOTAL BLDG. BEFORE DISASTER	=	254.000
TOTAL BLDG. DESTROYED	=	49.000
TOTAL BLDG. DAMAGED	=	174.000
RES. ACREAGE (DWELLING)	=	122.000
RES. ACREAGE (RELATED)	=	0.700
TOTAL RES. BLDG.	=	244.000
TOTAL RES. BLDG. DESTROYED	=	49.000
TOTAL RES. BLDG. DAMAGED	=	163.000
NONRES. ACREAGE	=	7.300
TOTAL NONRES. BLDG.	=	10.000
TOTAL NONRES. BLDG. DESTROYED	=	0.0
TOTAL NONRES. BLDG. DAMAGED	=	6.000
VACANT OR UNIMPROVED ACREAGE	=	72.000
DWELLING UNITS BEFORE FLOOD	=	244.000
UNUSABLE BUT REPARBL(NON-MIN)	=	154.000
UNUSABLE BUT REPARBL(MINORTY)	=	0.0
USABLE(NON-MINORITY)	=	30.000
USABLE(MINORITY)	=	0.0
TOTAL FAMILIES REMAINING	=	212.000
TOTAL NON-MIN FAMILIES	=	212.000
TOTAL MINORITY FAMILIES	=	0.0
PROJECT COST	=	$ 4.318 MILLION.

TABLE D-38
DATA FOR BALD EAGLE, CLINTON

PROJECT NUMBER 38
BALD EAGLE, CLINTON

THERE ARE 9 VARIATIONS FOR THIS PROJECT. THE BUDGET RANGE IS 20.0% TO 100.0%, IN STEPS OF 10.0%.

INPUT DATA(FOR 100% FUNDING):

TOTAL ACRES	=	1004.500
TOTAL BLDG. BEFORE DISASTER	=	138.000
TOTAL BLDG. DESTROYED	=	22.000
TOTAL BLDG. DAMAGED	=	116.000
RES. ACREAGE (DWELLING)	=	106.000
RES. ACREAGE (RELATED)	=	138.500
TOTAL RES. BLDG.	=	103.000
TOTAL RES. BLDG. DESTROYED	=	21.000
TOTAL RES. BLDG. DAMAGED	=	82.000
NONRES. ACREAGE	=	361.600
TOTAL NONRES. BLDG.	=	35.000
TOTAL NONRES. BLDG. DESTROYED	=	1.000
TOTAL NONRES. BLDG. DAMAGED	=	34.000
VACANT OR UNIMPROVED ACREAGE	=	342.000
DWELLING UNITS BEFORE FLOOD	=	108.000
UNUSABLE BUT REPARBL(NON-MIN)	=	0.0
UNUSABLE BUT REPARBL(MINORTY)	=	0.0
USABLE(NON-MINORITY)	=	77.000
USABLE(MINORITY)	=	0.0
TOTAL FAMILIES REMAINING	=	107.000
TOTAL NON-MIN FAMILIES	=	107.000
TOTAL MINORITY FAMILIES	=	0.0
PROJECT COST	=	$ 2.478 MILLION.

TABLE D-39
DATA FOR CASTANEA, CLINTON

PROJECT NUMBER 39
CASTANEA, CLINTON

THERE ARE 9 VARIATIONS FOR THIS PROJECT. THE BUDGET RANGE IS 20.0% TO 100.0%, IN STEPS OF 10.0%.

INPUT DATA(FOR 100% FUNDING):

TOTAL ACRES	=	165.700
TOTAL BLDG. BEFORE DISASTER	=	156.000
TOTAL BLDG. DESTROYED	=	42.000
TOTAL BLDG. DAMAGED	=	114.000
RES. ACREAGE (DWELLING)	=	46.200
RES. ACREAGE (RELATED)	=	0.0
TOTAL RES. BLDG.	=	153.000
TOTAL RES. BLDG. DESTROYED	=	41.000
TOTAL RES. BLDG. DAMAGED	=	112.000
NONRES. ACREAGE	=	54.400
TOTAL NONRES. BLDG.	=	3.000
TOTAL NONRES. BLDG. DESTROYED	=	1.000
TOTAL NONRES. BLDG. DAMAGED	=	2.000
VACANT OR UNIMPROVED ACREAGE	=	34.400
DWELLING UNITS BEFORE FLOOD	=	161.000
UNUSABLE BUT REPARBL(NON-MIN)	=	0.0
UNUSABLE BUT REPARBL(MINORTY)	=	0.0
USABLE(NON-MINORITY)	=	77.000
USABLE(MINORITY)	=	0.0
TOTAL FAMILIES REMAINING	=	155.000
TOTAL NON-MIN FAMILIES	=	155.000
TOTAL MINORITY FAMILIES	=	0.0
PROJECT COST	=	$ 4.046 MILLION.

TABLE D-40
DATA FOR LOCK HAVEN, CLINTON

PROJECT NUMBER 40
LOCK HAVEN, CLINTON

THERE ARE 9 VARIATIONS FOR THIS PROJECT. THE BUDGET RANGE IS 20.0% TO 100.0%, IN STEPS OF 10.0%.

INPUT DATA(FOR 100% FUNDING):

TOTAL ACRES	=	422.800
TOTAL BLDG. BEFORE DISASTER	=	1036.000
TOTAL BLDG. DESTROYED	=	202.000
TOTAL BLDG. DAMAGED	=	834.000
RES. ACREAGE (DWELLING)	=	148.900
RES. ACREAGE (RELATED)	=	17.500
TOTAL RES. BLDG.	=	918.000
TOTAL RES. BLDG. DESTROYED	=	195.000
TOTAL RES. BLDG. DAMAGED	=	723.000
NONRES. ACREAGE	=	55.600
TOTAL NONRES. BLDG.	=	118.000
TOTAL NONRES. BLDG. DESTROYED	=	7.000
TOTAL NONRES. BLDG. DAMAGED	=	111.000
VACANT OR UNIMPROVED ACREAGE	=	40.900
DWELLING UNITS BEFORE FLOOD	=	1347.000
UNUSABLE BUT REPARBL(NON-MIN)	=	0.0
UNUSABLE BUT REPARBL(MINORTY)	=	0.0
USABLE(NON-MINORITY)	=	580.000
USABLE(MINORITY)	=	0.0
TOTAL FAMILIES REMAINING	=	1320.000
TOTAL NON-MIN FAMILIES	=	1320.000
TOTAL MINORITY FAMILIES	=	0.0
PROJECT COST	=	$ 18.330 MILLION.

TABLE D-41
DATA FOR MILL HALL, CLINTON

PROJECT NUMBER 41
MILL HALL, CLINTON

THERE ARE 9 VARIATIONS FOR THIS PROJECT. THE BUDGET RANGE IS 20.0% TO 100.0%, IN STEPS OF 10.0%.

INPUT DATA(FOR 100% FUNDING):

TOTAL ACRES	=	229.100
TOTAL BLDG. BEFORE DISASTER	=	297.000
TOTAL BLDG. DESTROYED	=	17.000
TOTAL BLDG. DAMAGED	=	280.000
RES. ACREAGE (DWELLING)	=	54.300
RES. ACREAGE (RELATED)	=	3.900
TOTAL RES. BLDG.	=	271.000
TOTAL RES. BLDG. DESTROYED	=	15.000
TOTAL RES. BLDG. DAMAGED	=	256.000
NONRES. ACREAGE	=	22.700
TOTAL NONRES. BLDG.	=	26.000
TOTAL NONRES. BLDG. DESTROYED	=	2.000
TOTAL NONRES. BLDG. DAMAGED	=	24.000
VACANT OR UNIMPROVED ACREAGE	=	73.700
DWELLING UNITS BEFORE FLOOD	=	330.000
UNUSABLE BUT REPARBL(NON-MIN)	=	50.000
UNUSABLE BUT REPARBL(MINORTY)	=	0.0
USABLE(NON-MINORITY)	=	250.000
USABLE(MINORITY)	=	0.0
TOTAL FAMILIES REMAINING	=	309.000
TOTAL NON-MIN FAMILIES	=	309.000
TOTAL MINORITY FAMILIES	=	0.0
PROJECT COST	=	$ 5.077 MILLION.

TABLE D-42
DATA FOR RENOVO, CLINTON

PROJECT NUMBER 42
RENOVO, CLINTON

THERE ARE 9 VARIATIONS FOR THIS PROJECT. THE BUDGET RANGE IS 20.0% TO 100.0%, IN STEPS OF 10.0%.

INPUT DATA(FOR 100% FUNDING):

TOTAL ACRES	=	82.100
TOTAL BLDG. BEFORE DISASTER	=	241.000
TOTAL BLDG. DESTROYED	=	8.000
TOTAL BLDG. DAMAGED	=	233.000
RES. ACREAGE (DWELLING)	=	36.000
RES. ACREAGE (RELATED)	=	4.100
TOTAL RES. BLDG.	=	232.000
TOTAL RES. BLDG. DESTROYED	=	8.000
TOTAL RES. BLDG. DAMAGED	=	224.000
NONRES. ACREAGE	=	6.000
TOTAL NONRES. BLDG.	=	9.000
TOTAL NONRES. BLDG. DESTROYED	=	0.0
TOTAL NONRES. BLDG. DAMAGED	=	9.000
VACANT OR UNIMPROVED ACREAGE	=	7.200
DWELLING UNITS BEFORE FLOOD	=	418.000
UNUSABLE BUT REPARBL(NON-MIN)	=	0.0
UNUSABLE BUT REPARBL(MINORTY)	=	0.0
USABLE(NON-MINORITY)	=	123.000
USABLE(MINORITY)	=	0.0
TOTAL FAMILIES REMAINING	=	413.000
TOTAL NON-MIN FAMILIES	=	413.000
TOTAL MINORITY FAMILIES	=	0.0
PROJECT COST	=	$ 8.880 MILLION.

TABLE D-43
DATA FOR BLOOMSBURG, COLUMBIA

PROJECT NUMBER 43
BLOOMSBURG, COLUMBIA

THERE ARE 9 VARIATIONS FOR THIS PROJECT. THE BUDGET RANGE IS 20.0% TO 100.0%, IN STEPS OF 10.0%.

INPUT DATA(FOR 100% FUNDING):

TOTAL ACRES	=	499.090
TOTAL BLDG. BEFORE DISASTER	=	676.000
TOTAL BLDG. DESTROYED	=	0.0
TOTAL BLDG. DAMAGED	=	607.000
RES. ACREAGE (DWELLING)	=	133.260
RES. ACREAGE (RELATED)	=	0.260
TOTAL RES. BLDG.	=	611.000
TOTAL RES. BLDG. DESTROYED	=	0.0
TOTAL RES. BLDG. DAMAGED	=	546.000
NONRES. ACREAGE	=	196.700
TOTAL NONRES. BLDG.	=	65.000
TOTAL NONRES. BLDG. DESTROYED	=	0.0
TOTAL NONRES. BLDG. DAMAGED	=	61.000
VACANT OR UNIMPROVED ACREAGE	=	79.420
DWELLING UNITS BEFORE FLOOD	=	645.000
UNUSABLE BUT REPARBL(NON-MIN)	=	21.000
UNUSABLE BUT REPARBL(MINORTY)	=	0.0
USABLE(NON-MINORITY)	=	636.000
USABLE(MINORITY)	=	2.000
TOTAL FAMILIES REMAINING	=	609.000
TOTAL NON-MIN FAMILIES	=	607.000
TOTAL MINORITY FAMILIES	=	2.000
PROJECT COST	=	$ 7.194 MILLION.

TABLE D-44
DATA FOR CATAWISSA BORO, COLUMBIA

PROJECT NUMBER 44
CATAWISSA BORO, COLUMBIA

THERE ARE 9 VARIATIONS FOR THIS PROJECT. THE BUDGET RANGE IS 20.0% TO 100.0%, IN STEPS OF 10.0%.

INPUT DATA(FOR 100% FUNDING):

TOTAL ACRES	=	39.920
TOTAL BLDG. BEFORE DISASTER	=	94.000
TOTAL BLDG. DESTROYED	=	0.0
TOTAL BLDG. DAMAGED	=	81.000
RES. ACREAGE (DWELLING)	=	9.030
RES. ACREAGE (RELATED)	=	0.140
TOTAL RES. BLDG.	=	74.000
TOTAL RES. BLDG. DESTROYED	=	0.0
TOTAL RES. BLDG. DAMAGED	=	63.000
NONRES. ACREAGE	=	22.490
TOTAL NONRES. BLDG.	=	20.000
TOTAL NONRES. BLDG. DESTROYED	=	0.0
TOTAL NONRES. BLDG. DAMAGED	=	18.000
VACANT OR UNIMPROVED ACREAGE	=	0.740
DWELLING UNITS BEFORE FLOOD	=	81.000
UNUSABLE BUT REPARBL(NON-MIN)	=	0.0
UNUSABLE BUT REPARBL(MINORTY)	=	0.0
USABLE(NON-MINORITY)	=	81.000
USABLE(MINORITY)	=	0.0
TOTAL FAMILIES REMAINING	=	76.000
TOTAL NON-MIN FAMILIES	=	76.000
TOTAL MINORITY FAMILIES	=	0.0
PROJECT COST	= $	2.149 MILLION.

TABLE D-45
DATA FOR FERNVILLE, COLUMBIA

PROJECT NUMBER 45
FERNVILLE, COLUMBIA

THERE ARE 9 VARIATIONS FOR THIS PROJECT. THE BUDGET RANGE IS 20.0% TO 100.0%, IN STEPS OF 10.0%.

INPUT DATA(FOR 100% FUNDING):

TOTAL ACRES	=	27.050
TOTAL BLDG. BEFORE DISASTER	=	110.000
TOTAL BLDG. DESTROYED	=	7.000
TOTAL BLDG. DAMAGED	=	102.000
RES. ACREAGE (DWELLING)	=	20.890
RES. ACREAGE (RELATED)	=	0.170
TOTAL RES. BLDG.	=	104.000
TOTAL RES. BLDG. DESTROYED	=	7.000
TOTAL RES. BLDG. DAMAGED	=	96.000
NONRES. ACREAGE	=	0.560
TOTAL NONRES. BLDG.	=	6.000
TOTAL NONRES. BLDG. DESTROYED	=	0.0
TOTAL NONRES. BLDG. DAMAGED	=	6.000
VACANT OR UNIMPROVED ACREAGE	=	0.880
DWELLING UNITS BEFORE FLOOD	=	107.000
UNUSABLE BUT REPARBL(NON-MIN)	=	5.000
UNUSABLE BUT REPARBL(MINORTY)	=	0.0
USABLE(NON-MINORITY)	=	95.000
USABLE(MINORITY)	=	0.0
TOTAL FAMILIES REMAINING	=	92.000
TOTAL NON-MIN FAMILIES	=	92.000
TOTAL MINORITY FAMILIES	=	0.0
PROJECT COST	=	$ 1.737 MILLION.

TABLE D-46
DATA FOR DUBOISTOWN, LYCOMING

PROJECT NUMBER 46
DUBOISTOWN, LYCOMING

THERE ARE 9 VARIATIONS FOR THIS PROJECT. THE BUDGET RANGE IS 20.0% TO 100.0%, IN STEPS OF 10.0%.

INPUT DATA(FOR 100% FUNDING):

TOTAL ACRES	=	100.690
TOTAL BLDG. BEFORE DISASTER	=	139.000
TOTAL BLDG. DESTROYED	=	0.0
TOTAL BLDG. DAMAGED	=	139.000
RES. ACREAGE (DWELLING)	=	51.540
RES. ACREAGE (RELATED)	=	0.0
TOTAL RES. BLDG.	=	130.000
TOTAL RES. BLDG. DESTROYED	=	0.0
TOTAL RES. BLDG. DAMAGED	=	100.000
NONRES. ACREAGE	=	4.100
TOTAL NONRES. BLDG.	=	9.000
TOTAL NONRES. BLDG. DESTROYED	=	0.0
TOTAL NONRES. BLDG. DAMAGED	=	9.000
VACANT OR UNIMPROVED ACREAGE	=	27.720
DWELLING UNITS BEFORE FLOOD	=	112.000
UNUSABLE BUT REPARBL(NON-MIN)	=	1.000
UNUSABLE BUT REPARBL(MINORTY)	=	0.0
USABLE(NON-MINORITY)	=	91.000
USABLE(MINORITY)	=	0.0
TOTAL FAMILIES REMAINING	=	30.000
TOTAL NON-MIN FAMILIES	=	30.000
TOTAL MINORITY FAMILIES	=	0.0
PROJECT COST	=	$ 2.642 MILLION.

TABLE D-47
DATA FOR JERSEY SHORE, LYCOMING

PROJECT NUMBER 47
JERSEY SHORE, LYCOMING

THERE ARE 9 VARIATIONS FOR THIS PROJECT. THE BUDGET RANGE IS 20.0% TO 100.0%, IN STEPS OF 10.0%.

INPUT DATA(FOR 100% FUNDING):

TOTAL ACRES	=	290.700
TOTAL BLDG. BEFORE DISASTER	=	855.000
TOTAL BLDG. DESTROYED	=	5.000
TOTAL BLDG. DAMAGED	=	845.000
RES. ACREAGE (DWELLING)	=	131.400
RES. ACREAGE (RELATED)	=	2.900
TOTAL RES. BLDG.	=	786.000
TOTAL RES. BLDG. DESTROYED	=	5.000
TOTAL RES. BLDG. DAMAGED	=	776.000
NONRES. ACREAGE	=	55.100
TOTAL NONRES. BLDG.	=	69.000
TOTAL NONRES. BLDG. DESTROYED	=	0.0
TOTAL NONRES. BLDG. DAMAGED	=	69.000
VACANT OR UNIMPROVED ACREAGE	=	45.100
DWELLING UNITS BEFORE FLOOD	=	671.000
UNUSABLE BUT REPARBL(NON-MIN)	=	26.000
UNUSABLE BUT REPARBL(MINORTY)	=	0.0
USABLE(NON-MINORITY)	=	551.000
USABLE(MINORITY)	=	3.000
TOTAL FAMILIES REMAINING	=	510.000
TOTAL NON-MIN FAMILIES	=	509.000
TOTAL MINORITY FAMILIES	=	1.000
PROJECT COST	=	$ 11.788 MILLION.

TABLE D-48
DATA FOR MONTGOMERY, LYCOMING

PROJECT NUMBER 48
MONTGOMERY, LYCOMING

THERE ARE 9 VARIATIONS FOR THIS PROJECT. THE BUDGET RANGE IS 20.0% TO 100.0%, IN STEPS OF 10.0%.

INPUT DATA(FOR 100% FUNDING):

TOTAL ACRES	=	252.000
TOTAL BLDG. BEFORE DISASTER	=	357.000
TOTAL BLDG. DESTROYED	=	45.000
TOTAL BLDG. DAMAGED	=	236.000
RES. ACREAGE (DWELLING)	=	126.300
RES. ACREAGE (RELATED)	=	20.600
TOTAL RES. BLDG.	=	310.000
TOTAL RES. BLDG. DESTROYED	=	40.000
TOTAL RES. BLDG. DAMAGED	=	199.000
NONRES. ACREAGE	=	52.400
TOTAL NONRES. BLDG.	=	44.000
TOTAL NONRES. BLDG. DESTROYED	=	3.000
TOTAL NONRES. BLDG. DAMAGED	=	36.000
VACANT OR UNIMPROVED ACREAGE	=	4.600
DWELLING UNITS BEFORE FLOOD	=	432.000
UNUSABLE BUT REPARBL(NON-MIN)	=	125.000
UNUSABLE BUT REPARBL(MINORTY)	=	0.0
USABLE(NON-MINORITY)	=	307.000
USABLE(MINORITY)	=	0.0
TOTAL FAMILIES REMAINING	=	300.000
TOTAL NON-MIN FAMILIES	=	300.000
TOTAL MINORITY FAMILIES	=	0.0
PROJECT COST	=	$ 5.219 MILLION.

TABLE D-49
DATA FOR MONTOURSVILLE, LYCOMING

PROJECT NUMBER 49
MONTOURSVILLE, LYCOMING

THERE ARE 9 VARIATIONS FOR THIS PROJECT. THE BUDGET RANGE IS 20.0% TO 100.0%, IN STEPS OF 10.0%.

INPUT DATA(FOR 100% FUNDING):

TOTAL ACRES	=	760.000
TOTAL BLDG. BEFORE DISASTER	=	177.000
TOTAL BLDG. DESTROYED	=	70.000
TOTAL BLDG. DAMAGED	=	107.000
RES. ACREAGE (DWELLING)	=	117.000
RES. ACREAGE (RELATED)	=	0.0
TOTAL RES. BLDG.	=	158.000
TOTAL RES. BLDG. DESTROYED	=	66.000
TOTAL RES. BLDG. DAMAGED	=	92.000
NONRES. ACREAGE	=	42.000
TOTAL NONRES. BLDG.	=	19.000
TOTAL NONRES. BLDG. DESTROYED	=	4.000
TOTAL NONRES. BLDG. DAMAGED	=	15.000
VACANT OR UNIMPROVED ACREAGE	=	577.000
DWELLING UNITS BEFORE FLOOD	=	175.000
UNUSABLE BUT REPARBL(NON-MIN)	=	20.000
UNUSABLE BUT REPARBL(MINORTY)	=	0.0
USABLE(NON-MINORITY)	=	115.000
USABLE(MINORITY)	=	0.0
TOTAL FAMILIES REMAINING	=	135.000
TOTAL NON-MIN FAMILIES	=	135.000
TOTAL MINORITY FAMILIES	=	0.0
PROJECT COST	=	$ 3.412 MILLION.

TABLE D-50
DATA FOR MUNCY, LYCOMING

PROJECT NUMBER 50
MUNCY, LYCOMING

THERE ARE 9 VARIATIONS FOR THIS PROJECT. THE BUDGET RANGE IS 20.0% TO 100.0%, IN STEPS OF 10.0%.

INPUT DATA(FOR 100% FUNDING):

TOTAL ACRES	=	211.000
TOTAL BLDG. BEFORE DISASTER	=	410.000
TOTAL BLDG. DESTROYED	=	72.000
TOTAL BLDG. DAMAGED	=	335.000
RES. ACREAGE (DWELLING)	=	72.000
RES. ACREAGE (RELATED)	=	5.000
TOTAL RES. BLDG.	=	334.000
TOTAL RES. BLDG. DESTROYED	=	66.000
TOTAL RES. BLDG. DAMAGED	=	263.000
NONRES. ACREAGE	=	42.000
TOTAL NONRES. BLDG.	=	76.000
TOTAL NONRES. BLDG. DESTROYED	=	6.000
TOTAL NONRES. BLDG. DAMAGED	=	67.000
VACANT OR UNIMPROVED ACREAGE	=	50.000
DWELLING UNITS BEFORE FLOOD	=	333.000
UNUSABLE BUT REPARBL(NON-MIN)	=	100.000
UNUSABLE BUT REPARBL(MINORTY)	=	0.0
USABLE(NON-MINORITY)	=	238.000
USABLE(MINORITY)	=	0.0
TOTAL FAMILIES REMAINING	=	200.000
TOTAL NON-MIN FAMILIES	=	200.000
TOTAL MINORITY FAMILIES	=	0.0
PROJECT COST	=	$ 4.216 MILLION.

TABLE D-51
DATA FOR LYCOMING, LYCOMING

PROJECT NUMBER 51
OLD LYCOMING, LYCOMING

THERE ARE 9 VARIATIONS FOR THIS PROJECT. THE BUDGET RANGE IS 20.0% TO 100.0%, IN STEPS OF 10.0%.

INPUT DATA(FOR 100% FUNDING):

TOTAL ACRES	=	105.000
TOTAL BLDG. BEFORE DISASTER	=	164.000
TOTAL BLDG. DESTROYED	=	37.000
TOTAL BLDG. DAMAGED	=	111.000
RES. ACREAGE (DWELLING)	=	44.000
RES. ACREAGE (RELATED)	=	0.0
TOTAL RES. BLDG.	=	154.000
TOTAL RES. BLDG. DESTROYED	=	37.000
TOTAL RES. BLDG. DAMAGED	=	102.000
NONRES. ACREAGE	=	6.000
TOTAL NONRES. BLDG.	=	10.000
TOTAL NONRES. BLDG. DESTROYED	=	0.0
TOTAL NONRES. BLDG. DAMAGED	=	9.000
VACANT OR UNIMPROVED ACREAGE	=	35.000
DWELLING UNITS BEFORE FLOOD	=	170.000
UNUSABLE BUT REPARBL(NON-MIN)	=	10.000
UNUSABLE BUT REPARBL(MINORTY)	=	0.0
USABLE(NON-MINORITY)	=	120.000
USABLE(MINORITY)	=	0.0
TOTAL FAMILIES REMAINING	=	130.000
TOTAL NON-MIN FAMILIES	=	130.000
TOTAL MINORITY FAMILIES	=	0.0
PROJECT COST	=	$ 2.344 MILLION.

TABLE D-52
DATA FOR SOUTH WILLIAMSPORT, LYCOMING

PROJECT NUMBER 52
SOUTH WILLIAMSPORT, LYCOMING

THERE ARE 9 VARIATIONS FOR THIS PROJECT. THE BUDGET RANGE IS 20.0% TO 100.0%, IN STEPS OF 10.0%.

INPUT DATA(FOR 100% FUNDING):

TOTAL ACRES	=	96.600
TOTAL BLDG. BEFORE DISASTER	=	156.000
TOTAL BLDG. DESTROYED	=	0.0
TOTAL BLDG. DAMAGED	=	135.000
RES. ACREAGE (DWELLING)	=	28.140
RES. ACREAGE (RELATED)	=	5.000
TOTAL RES. BLDG.	=	143.000
TOTAL RES. BLDG. DESTROYED	=	0.0
TOTAL RES. BLDG. DAMAGED	=	125.000
NONRES. ACREAGE	=	6.550
TOTAL NONRES. BLDG.	=	13.000
TOTAL NONRES. BLDG. DESTROYED	=	0.0
TOTAL NONRES. BLDG. DAMAGED	=	10.000
VACANT OR UNIMPROVED ACREAGE	=	23.700
DWELLING UNITS BEFORE FLOOD	=	150.000
UNUSABLE BUT REPARBL(NON-MIN)	=	25.000
UNUSABLE BUT REPARBL(MINORTY)	=	0.0
USABLE(NON-MINORITY)	=	125.000
USABLE(MINORITY)	=	0.0
TOTAL FAMILIES REMAINING	=	350.000
TOTAL NON-MIN FAMILIES	=	350.000
TOTAL MINORITY FAMILIES	=	0.0
PROJECT COST	=	$ 3.180 MILLION.

TABLE D-53
DATA FOR LEWISTOWN, MIFFLIN

PROJECT NUMBER 53
LEWISTOWN, MIFFLIN

THERE ARE 9 VARIATIONS FOR THIS PROJECT. THE BUDGET RANGE IS 20.0% TO 100.0%, IN STEPS OF 10.0%.

INPUT DATA(FOR 100% FUNDING):

TOTAL ACRES	=	91.000
TOTAL BLDG. BEFORE DISASTER	=	357.000
TOTAL BLDG. DESTROYED	=	60.000
TOTAL BLDG. DAMAGED	=	274.000
RES. ACREAGE (DWELLING)	=	43.700
RES. ACREAGE (RELATED)	=	2.800
TOTAL RES. BLDG.	=	310.000
TOTAL RES. BLDG. DESTROYED	=	52.000
TOTAL RES. BLDG. DAMAGED	=	242.000
NONRES. ACREAGE	=	14.200
TOTAL NONRES. BLDG.	=	47.000
TOTAL NONRES. BLDG. DESTROYED	=	8.000
TOTAL NONRES. BLDG. DAMAGED	=	32.000
VACANT OR UNIMPROVED ACREAGE	=	0.0
DWELLING UNITS BEFORE FLOOD	=	309.000
UNUSABLE BUT REPARBL(NON-MIN)	=	106.000
UNUSABLE BUT REPARBL(MINORTY)	=	1.000
USABLE(NON-MINORITY)	=	15.000
USABLE(MINORITY)	=	0.0
TOTAL FAMILIES REMAINING	=	198.000
TOTAL NON-MIN FAMILIES	=	197.000
TOTAL MINORITY FAMILIES	=	1.000
PROJECT COST	=	$ 5.683 MILLION.

TABLE D-54
DATA FOR DANVILLE, MONTOUR

PROJECT NUMBER 54
DANVILLE, MONTOUR

THERE ARE 9 VARIATIONS FOR THIS PROJECT. THE BUDGET RANGE IS 20.0% TO 100.0%, IN STEPS OF 10.0%.

INPUT DATA(FOR 100% FUNDING):

TOTAL ACRES	=	495.000
TOTAL BLDG. BEFORE DISASTER	=	880.000
TOTAL BLDG. DESTROYED	=	100.000
TOTAL BLDG. DAMAGED	=	520.000
RES. ACREAGE (DWELLING)	=	165.000
RES. ACREAGE (RELATED)	=	110.000
TOTAL RES. BLDG.	=	795.000
TOTAL RES. BLDG. DESTROYED	=	80.000
TOTAL RES. BLDG. DAMAGED	=	480.000
NONRES. ACREAGE	=	75.000
TOTAL NONRES. BLDG.	=	85.000
TOTAL NONRES. BLDG. DESTROYED	=	20.000
TOTAL NONRES. BLDG. DAMAGED	=	40.000
VACANT OR UNIMPROVED ACREAGE	=	85.000
DWELLING UNITS BEFORE FLOOD	=	1160.000
UNUSABLE BUT REPARBL(NON-MIN)	=	160.000
UNUSABLE BUT REPARBL(MINORTY)	=	0.0
USABLE(NON-MINORITY)	=	900.000
USABLE(MINORITY)	=	0.0
TOTAL FAMILIES REMAINING	=	900.000
TOTAL NON-MIN FAMILIES	=	900.000
TOTAL MINORITY FAMILIES	=	0.0
PROJECT COST	=	$ 8.062 MILLION.

TABLE D-55
DATA FOR MILTON, NORTHUMBERLAND

PROJECT NUMBER 55
MILTON, NORTHUMBERLAND

THERE ARE 9 VARIATIONS FOR THIS PROJECT. THE BUDGET RANGE IS 20.0% TO 100.0%, IN STEPS OF 10.0%.

INPUT DATA(FOR 100% FUNDING):

TOTAL ACRES	=	236.500
TOTAL BLDG. BEFORE DISASTER	=	544.000
TOTAL BLDG. DESTROYED	=	0.0
TOTAL BLDG. DAMAGED	=	544.000
RES. ACREAGE (DWELLING)	=	82.200
RES. ACREAGE (RELATED)	=	0.0
TOTAL RES. BLDG.	=	501.000
TOTAL RES. BLDG. DESTROYED	=	0.0
TOTAL RES. BLDG. DAMAGED	=	501.000
NONRES. ACREAGE	=	53.200
TOTAL NONRES. BLDG.	=	43.000
TOTAL NONRES. BLDG. DESTROYED	=	0.0
TOTAL NONRES. BLDG. DAMAGED	=	43.000
VACANT OR UNIMPROVED ACREAGE	=	54.400
DWELLING UNITS BEFORE FLOOD	=	667.000
UNUSABLE BUT REPARBL(NON-MIN)	=	100.000
UNUSABLE BUT REPARBL(MINORTY)	=	0.0
USABLE(NON-MINORITY)	=	567.000
USABLE(MINORITY)	=	0.0
TOTAL FAMILIES REMAINING	=	652.000
TOTAL NON-MIN FAMILIES	=	652.000
TOTAL MINORITY FAMILIES	=	0.0
PROJECT COST	=	$ 14.452 MILLION.

TABLE D-56
DATA FOR TURBOT, NORTHUMBERLAND

PROJECT NUMBER 56
TURBOT, NORTHUMBERLAND

THERE ARE 9 VARIATIONS FOR THIS PROJECT. THE BUDGET RANGE IS 20.0% TO 100.0%, IN STEPS OF 10.0%.

INPUT DATA(FOR 100% FUNDING):

TOTAL ACRES	=	136.700
TOTAL BLDG. BEFORE DISASTER	=	44.000
TOTAL BLDG. DESTROYED	=	0.0
TOTAL BLDG. DAMAGED	=	38.000
RES. ACREAGE (DWELLING)	=	3.730
RES. ACREAGE (RELATED)	=	0.0
TOTAL RES. BLDG.	=	31.000
TOTAL RES. BLDG. DESTROYED	=	0.0
TOTAL RES. BLDG. DAMAGED	=	31.000
NONRES. ACREAGE	=	123.380
TOTAL NONRES. BLDG.	=	13.000
TOTAL NONRES. BLDG. DESTROYED	=	0.0
TOTAL NONRES. BLDG. DAMAGED	=	7.000
VACANT OR UNIMPROVED ACREAGE	=	0.0
DWELLING UNITS BEFORE FLOOD	=	39.000
UNUSABLE BUT REPARBL(NON-MIN)	=	0.0
UNUSABLE BUT REPARBL(MINORTY)	=	0.0
USABLE(NON-MINORITY)	=	37.000
USABLE(MINORITY)	=	0.0
TOTAL FAMILIES REMAINING	=	37.000
TOTAL NON-MIN FAMILIES	=	37.000
TOTAL MINORITY FAMILIES	=	0.0
PROJECT COST	=	$ 2.850 MILLION.

TABLE D-57
DATA FOR LEWISBURG, UNION

PROJECT NUMBER 57
LEWISBURG, UNION

THERE ARE 9 VARIATIONS FOR THIS PROJECT. THE BUDGET RANGE IS 20.0% TO 100.0%, IN STEPS OF 10.0%.

INPUT DATA(FOR 100% FUNDING):

TOTAL ACRES	=	160.000
TOTAL BLDG. BEFORE DISASTER	=	313.000
TOTAL BLDG. DESTROYED	=	27.000
TOTAL BLDG. DAMAGED	=	276.000
RES. ACREAGE (DWELLING)	=	55.000
RES. ACREAGE (RELATED)	=	10.000
TOTAL RES. BLDG.	=	265.000
TOTAL RES. BLDG. DESTROYED	=	21.000
TOTAL RES. BLDG. DAMAGED	=	241.000
NONRES. ACREAGE	=	38.000
TOTAL NONRES. BLDG.	=	48.000
TOTAL NONRES. BLDG. DESTROYED	=	6.000
TOTAL NONRES. BLDG. DAMAGED	=	35.000
VACANT OR UNIMPROVED ACREAGE	=	27.000
DWELLING UNITS BEFORE FLOOD	=	350.000
UNUSABLE BUT REPARBL(NON-MIN)	=	10.000
UNUSABLE BUT REPARBL(MINORTY)	=	0.0
USABLE(NON-MINORITY)	=	310.000
USABLE(MINORITY)	=	10.000
TOTAL FAMILIES REMAINING	=	340.000
TOTAL NON-MIN FAMILIES	=	323.000
TOTAL MINORITY FAMILIES	=	17.000
PROJECT COST	=	$ 5.338 MILLION.

TABLE D-58
DATA FOR HARRISBURG (CAMERON-SOUTH), DAUPHIN

PROJECT NUMBER 58
HARRISBURG(CAMERON-SOUTH), DAUPHIN

THERE ARE 9 VARIATIONS FOR THIS PROJECT. THE BUDGET RANGE IS 20.0% TO 100.0%, IN STEPS OF 10.0%.

INPUT DATA(FOR 100% FUNDING):

TOTAL ACRES	=	408.500
TOTAL BLDG. BEFORE DISASTER	=	1136.000
TOTAL BLDG. DESTROYED	=	2.000
TOTAL BLDG. DAMAGED	=	834.000
RES. ACREAGE (DWELLING)	=	35.100
RES. ACREAGE (RELATED)	=	0.0
TOTAL RES. BLDG.	=	872.000
TOTAL RES. BLDG. DESTROYED	=	2.000
TOTAL RES. BLDG. DAMAGED	=	563.000
NONRES. ACREAGE	=	265.600
TOTAL NONRES. BLDG.	=	264.000
TOTAL NONRES. BLDG. DESTROYED	=	0.0
TOTAL NONRES. BLDG. DAMAGED	=	261.000
VACANT OR UNIMPROVED ACREAGE	=	26.200
DWELLING UNITS BEFORE FLOOD	=	654.000
UNUSABLE BUT REPARBL(NON-MIN)	=	292.000
UNUSABLE BUT REPARBL(MINORTY)	=	188.000
USABLE(NON-MINORITY)	=	104.000
USABLE(MINORITY)	=	68.000
TOTAL FAMILIES REMAINING	=	120.000
TOTAL NON-MIN FAMILIES	=	73.000
TOTAL MINORITY FAMILIES	=	47.000
PROJECT COST	=	$ 13.858 MILLION.

TABLE D-59
DATA FOR HARRISBURG (SENECA-SUSQ), DAUPHIN

PROJECT NUMBER 59
HARRISBURG(SENECA-SUSQ), DAUPHIN

THERE ARE 9 VARIATIONS FOR THIS PROJECT. THE BUDGET RANGE IS 20.0% TO 100.0%, IN STEPS OF 10.0%.

INPUT DATA(FOR 100% FUNDING):

TOTAL ACRES	=	322.400
TOTAL BLDG. BEFORE DISASTER	=	3535.000
TOTAL BLDG. DESTROYED	=	61.000
TOTAL BLDG. DAMAGED	=	1467.000
RES. ACREAGE (DWELLING)	=	120.300
RES. ACREAGE (RELATED)	=	29.900
TOTAL RES. BLDG.	=	3213.000
TOTAL RES. BLDG. DESTROYED	=	61.000
TOTAL RES. BLDG. DAMAGED	=	1306.000
NONRES. ACREAGE	=	53.800
TOTAL NONRES. BLDG.	=	322.000
TOTAL NONRES. BLDG. DESTROYED	=	0.0
TOTAL NONRES. BLDG. DAMAGED	=	161.000
VACANT OR UNIMPROVED ACREAGE	=	7.300
DWELLING UNITS BEFORE FLOOD	=	4782.000
UNUSABLE BUT REPARBL(NON-MIN)	=	1211.000
UNUSABLE BUT REPARBL(MINORTY)	=	422.000
USABLE(NON-MINORITY)	=	2164.000
USABLE(MINORITY)	=	973.000
TOTAL FAMILIES REMAINING	=	4531.000
TOTAL NON-MIN FAMILIES	=	3625.000
TOTAL MINORITY FAMILIES	=	906.000
PROJECT COST	=	$ 12.786 MILLION.

TABLE D-60
DATA FOR HIGHSPIRE, DAUPHIN

PROJECT NUMBER 60
HIGHSPIRE, DAUPHIN

THERE ARE 9 VARIATIONS FOR THIS PROJECT. THE BUDGET RANGE IS 20.0% TO 100.0%, IN STEPS OF 10.0%.

INPUT DATA(FOR 100% FUNDING):

TOTAL ACRES	=	113.560
TOTAL BLDG. BEFORE DISASTER	=	350.000
TOTAL BLDG. DESTROYED	=	0.0
TOTAL BLDG. DAMAGED	=	234.000
RES. ACREAGE (DWELLING)	=	48.600
RES. ACREAGE (RELATED)	=	0.0
TOTAL RES. BLDG.	=	304.000
TOTAL RES. BLDG. DESTROYED	=	0.0
TOTAL RES. BLDG. DAMAGED	=	203.000
NONRES. ACREAGE	=	14.500
TOTAL NONRES. BLDG.	=	46.000
TOTAL NONRES. BLDG. DESTROYED	=	0.0
TOTAL NONRES. BLDG. DAMAGED	=	31.000
VACANT OR UNIMPROVED ACREAGE	=	21.590
DWELLING UNITS BEFORE FLOOD	=	334.000
UNUSABLE BUT REPARBL(NON-MIN)	=	73.000
UNUSABLE BUT REPARBL(MINORTY)	=	0.0
USABLE(NON-MINORITY)	=	200.000
USABLE(MINORITY)	=	0.0
TOTAL FAMILIES REMAINING	=	339.000
TOTAL NON-MIN FAMILIES	=	339.000
TOTAL MINORITY FAMILIES	=	0.0
PROJECT COST	=	$ 5.781 MILLION.

TABLE D-61
DATA FOR LYKENS, DAUPHIN

PROJECT NUMBER 61
LYKENS, DAUPHIN

THERE ARE 9 VARIATIONS FOR THIS PROJECT. THE BUDGET RANGE IS 20.0% TO 100.0%, IN STEPS OF 10.0%.

INPUT DATA(FOR 100% FUNDING):

TOTAL ACRES	=	108.500
TOTAL BLDG. BEFORE DISASTER	=	473.000
TOTAL BLDG. DESTROYED	=	6.000
TOTAL BLDG. DAMAGED	=	307.000
RES. ACREAGE (DWELLING)	=	40.490
RES. ACREAGE (RELATED)	=	0.0
TOTAL RES. BLDG.	=	428.000
TOTAL RES. BLDG. DESTROYED	=	6.000
TOTAL RES. BLDG. DAMAGED	=	277.000
NONRES. ACREAGE	=	18.880
TOTAL NONRES. BLDG.	=	45.000
TOTAL NONRES. BLDG. DESTROYED	=	0.0
TOTAL NONRES. BLDG. DAMAGED	=	30.000
VACANT OR UNIMPROVED ACREAGE	=	17.500
DWELLING UNITS BEFORE FLOOD	=	470.000
UNUSABLE BUT REPARBL(NON-MIN)	=	46.000
UNUSABLE BUT REPARBL(MINORTY)	=	0.0
USABLE(NON-MINORITY)	=	304.000
USABLE(MINORITY)	=	0.0
TOTAL FAMILIES REMAINING	=	408.000
TOTAL NON-MIN FAMILIES	=	408.000
TOTAL MINORITY FAMILIES	=	0.0
PROJECT COST	=	$ 6.542 MILLION.

TABLE D-62
DATA FOR MIDDLETOWN, DAUPHIN

PROJECT NUMBER 62
MIDDLETOWN, DAUPHIN

THERE ARE 9 VARIATIONS FOR THIS PROJECT. THE BUDGET RANGE IS 20.0% TO 100.0%, IN STEPS OF 10.0%.

INPUT DATA(FOR 100% FUNDING):

TOTAL ACRES	=	79.150
TOTAL BLDG. BEFORE DISASTER	=	283.000
TOTAL BLDG. DESTROYED	=	62.000
TOTAL BLDG. DAMAGED	=	178.000
RES. ACREAGE (DWELLING)	=	38.120
RES. ACREAGE (RELATED)	=	0.0
TOTAL RES. BLDG.	=	257.000
TOTAL RES. BLDG. DESTROYED	=	60.000
TOTAL RES. BLDG. DAMAGED	=	163.000
NONRES. ACREAGE	=	8.190
TOTAL NONRES. BLDG.	=	226.000
TOTAL NONRES. BLDG. DESTROYED	=	2.000
TOTAL NONRES. BLDG. DAMAGED	=	15.000
VACANT OR UNIMPROVED ACREAGE	=	13.150
DWELLING UNITS BEFORE FLOOD	=	282.000
UNUSABLE BUT REPARBL(NON-MIN)	=	38.000
UNUSABLE BUT REPARBL(MINORTY)	=	2.000
USABLE(NON-MINORITY)	=	177.000
USABLE(MINORITY)	=	5.000
TOTAL FAMILIES REMAINING	=	277.000
TOTAL NON-MIN FAMILIES	=	270.000
TOTAL MINORITY FAMILIES	=	7.000
PROJECT COST	=	$ 6.966 MILLION.

TABLE D-63
DATA FOR STEELTON, DAUPHIN

PROJECT NUMBER 63
STEELTON, DAUPHIN

THERE ARE 9 VARIATIONS FOR THIS PROJECT. THE BUDGET RANGE IS 20.0% TO 100.0%, IN STEPS OF 10.0%.

INPUT DATA(FOR 100% FUNDING):

TOTAL ACRES	=	44.500
TOTAL BLDG. BEFORE DISASTER	=	421.000
TOTAL BLDG. DESTROYED	=	130.000
TOTAL BLDG. DAMAGED	=	251.000
RES. ACREAGE (DWELLING)	=	16.500
RES. ACREAGE (RELATED)	=	3.100
TOTAL RES. BLDG.	=	415.000
TOTAL RES. BLDG. DESTROYED	=	127.000
TOTAL RES. BLDG. DAMAGED	=	251.000
NONRES. ACREAGE	=	4.900
TOTAL NONRES. BLDG.	=	6.000
TOTAL NONRES. BLDG. DESTROYED	=	3.000
TOTAL NONRES. BLDG. DAMAGED	=	0.0
VACANT OR UNIMPROVED ACREAGE	=	6.100
DWELLING UNITS BEFORE FLOOD	=	460.000
UNUSABLE BUT REPARBL(NON-MIN)	=	25.000
UNUSABLE BUT REPARBL(MINORTY)	=	25.000
USABLE(NON-MINORITY)	=	100.000
USABLE(MINORITY)	=	90.000
TOTAL FAMILIES REMAINING	=	190.000
TOTAL NON-MIN FAMILIES	=	100.000
TOTAL MINORITY FAMILIES	=	90.000
PROJECT COST	=	$ 8.931 MILLION.

TABLE D-64
DATA FOR MARIETTA, LANCASTER

PROJECT NUMBER 64
MARIETTA, LANCASTER

THERE ARE 9 VARIATIONS FOR THIS PROJECT. THE BUDGET RANGE IS 20.0% TO 100.0%, IN STEPS OF 10.0%.

INPUT DATA(FOR 100% FUNDING):

TOTAL ACRES	=	68.500
TOTAL BLDG. BEFORE DISASTER	=	298.000
TOTAL BLDG. DESTROYED	=	16.000
TOTAL BLDG. DAMAGED	=	207.000
RES. ACREAGE (DWELLING)	=	50.900
RES. ACREAGE (RELATED)	=	0.0
TOTAL RES. BLDG.	=	264.000
TOTAL RES. BLDG. DESTROYED	=	13.000
TOTAL RES. BLDG. DAMAGED	=	180.000
NONRES. ACREAGE	=	10.100
TOTAL NONRES. BLDG.	=	34.000
TOTAL NONRES. BLDG. DESTROYED	=	1.000
TOTAL NONRES. BLDG. DAMAGED	=	27.000
VACANT OR UNIMPROVED ACREAGE	=	1.500
DWELLING UNITS BEFORE FLOOD	=	299.000
UNUSABLE BUT REPARBL(NON-MIN)	=	18.000
UNUSABLE BUT REPARBL(MINORTY)	=	0.0
USABLE(NON-MINORITY)	=	244.000
USABLE(MINORITY)	=	0.0
TOTAL FAMILIES REMAINING	=	219.000
TOTAL NON-MIN FAMILIES	=	213.000
TOTAL MINORITY FAMILIES	=	1.000
PROJECT COST	=	$ 1.484 MILLION.

TABLE D-65
DATA FOR LEBANON, LEBANON

PROJECT NUMBER 65
LEBANON, LEBANON

THERE ARE 9 VARIATIONS FOR THIS PROJECT. THE BUDGET RANGE IS 20.0% TO 100.0%, IN STEPS OF 10.0%.

INPUT DATA(FOR 100% FUNDING):

TOTAL ACRES	=	402.690
TOTAL BLDG. BEFORE DISASTER	=	1709.000
TOTAL BLDG. DESTROYED	=	39.000
TOTAL BLDG. DAMAGED	=	1098.000
RES. ACREAGE (DWELLING)	=	162.170
RES. ACREAGE (RELATED)	=	9.570
TOTAL RES. BLDG.	=	1466.000
TOTAL RES. BLDG. DESTROYED	=	39.000
TOTAL RES. BLDG. DAMAGED	=	944.000
NONRES. ACREAGE	=	139.410
TOTAL NONRES. BLDG.	=	243.000
TOTAL NONRES. BLDG. DESTROYED	=	0.0
TOTAL NONRES. BLDG. DAMAGED	=	154.000
VACANT OR UNIMPROVED ACREAGE	=	0.0
DWELLING UNITS BEFORE FLOOD	=	1185.000
UNUSABLE BUT REPARBL(NON-MIN)	=	0.0
UNUSABLE BUT REPARBL(MINORTY)	=	0.0
USABLE(NON-MINORITY)	=	1075.000
USABLE(MINORITY)	=	75.000
TOTAL FAMILIES REMAINING	=	186.000
TOTAL NON-MIN FAMILIES	=	173.000
TOTAL MINORITY FAMILIES	=	13.000
PROJECT COST	=	$ 27.452 MILLION.

TABLE D-66
DATA FOR YORK (URA #1), YORK

PROJECT NUMBER 66
YORK(URA #1), YORK

THERE ARE 9 VARIATIONS FOR THIS PROJECT. THE BUDGET RANGE IS 20.0% TO 100.0%, IN STEPS OF 10.0%.

INPUT DATA(FOR 100% FUNDING):

TOTAL ACRES	=	104.600
TOTAL BLDG. BEFORE DISASTER	=	504.000
TOTAL BLDG. DESTROYED	=	41.000
TOTAL BLDG. DAMAGED	=	463.000
RES. ACREAGE (DWELLING)	=	39.600
RES. ACREAGE (RELATED)	=	6.100
TOTAL RES. BLDG.	=	432.000
TOTAL RES. BLDG. DESTROYED	=	39.000
TOTAL RES. BLDG. DAMAGED	=	393.000
NONRES. ACREAGE	=	37.100
TOTAL NONRES. BLDG.	=	72.000
TOTAL NONRES. BLDG. DESTROYED	=	2.000
TOTAL NONRES. BLDG. DAMAGED	=	70.000
VACANT OR UNIMPROVED ACREAGE	=	12.800
DWELLING UNITS BEFORE FLOOD	=	428.000
UNUSABLE BUT REPARBL(NON-MIN)	=	8.000
UNUSABLE BUT REPARBL(MINORTY)	=	4.000
USABLE(NON-MINORITY)	=	150.000
USABLE(MINORITY)	=	65.000
TOTAL FAMILIES REMAINING	=	215.000
TOTAL NON-MIN FAMILIES	=	150.000
TOTAL MINORITY FAMILIES	=	65.000
PROJECT COST	=	$ 4.989 MILLION.

TABLE D-67
DATA FOR YORK (URA #2), YORK

PROJECT NUMBER 67
YORK(URA #2), YORK

THERE ARE 9 VARIATIONS FOR THIS PROJECT. THE BUDGET RANGE IS 20.0% TO 100.0%, IN STEPS OF 10.0%.

INPUT DATA(FOR 100% FUNDING):

TOTAL ACRES	=	28.810
TOTAL BLDG. BEFORE DISASTER	=	130.000
TOTAL BLDG. DESTROYED	=	0.0
TOTAL BLDG. DAMAGED	=	123.000
RES. ACREAGE (DWELLING)	=	5.740
RES. ACREAGE (RELATED)	=	0.900
TOTAL RES. BLDG.	=	112.000
TOTAL RES. BLDG. DESTROYED	=	0.0
TOTAL RES. BLDG. DAMAGED	=	108.000
NONRES. ACREAGE	=	7.590
TOTAL NONRES. BLDG.	=	18.000
TOTAL NONRES. BLDG. DESTROYED	=	0.0
TOTAL NONRES. BLDG. DAMAGED	=	15.000
VACANT OR UNIMPROVED ACREAGE	=	2.180
DWELLING UNITS BEFORE FLOOD	=	119.000
UNUSABLE BUT REPARBL(NON-MIN)	=	9.000
UNUSABLE BUT REPARBL(MINORTY)	=	0.0
USABLE(NON-MINORITY)	=	109.000
USABLE(MINORITY)	=	1.000
TOTAL FAMILIES REMAINING	=	110.000
TOTAL NON-MIN FAMILIES	=	109.000
TOTAL MINORITY FAMILIES	=	1.000
PROJECT COST	=	$ 1.416 MILLION.

TABLE D-68
DATA FOR MCKEES ROCKS, ALLEGHENY

PROJECT NUMBER 68
MCKEES ROCKS, ALLEGHENY

THERE ARE 9 VARIATIONS FOR THIS PROJECT. THE BUDGET RANGE IS 20.0% TO 100.0%, IN STEPS OF 10.0%.

INPUT DATA(FOR 100% FUNDING):

TOTAL ACRES	=	93.200
TOTAL BLDG. BEFORE DISASTER	=	494.000
TOTAL BLDG. DESTROYED	=	0.0
TOTAL BLDG. DAMAGED	=	494.000
RES. ACREAGE (DWELLING)	=	32.800
RES. ACREAGE (RELATED)	=	4.900
TOTAL RES. BLDG.	=	412.000
TOTAL RES. BLDG. DESTROYED	=	0.0
TOTAL RES. BLDG. DAMAGED	=	412.000
NONRES. ACREAGE	=	19.600
TOTAL NONRES. BLDG.	=	82.000
TOTAL NONRES. BLDG. DESTROYED	=	0.0
TOTAL NONRES. BLDG. DAMAGED	=	82.000
VACANT OR UNIMPROVED ACREAGE	=	8.700
DWELLING UNITS BEFORE FLOOD	=	951.000
UNUSABLE BUT REPARBL(NON-MIN)	=	51.000
UNUSABLE BUT REPARBL(MINORTY)	=	0.0
USABLE(NON-MINORITY)	=	900.000
USABLE(MINORITY)	=	0.0
TOTAL FAMILIES REMAINING	=	645.000
TOTAL NON-MIN FAMILIES	=	642.000
TOTAL MINORITY FAMILIES	=	3.000
PROJECT COST	=	$ 6.493 MILLION.

TABLE D-69
DATA FOR HOLIDAYSBURG, BLAIR

PROJECT NUMBER 69
HOLIDAYSBURG, BLAIR

THERE ARE 9 VARIATIONS FOR THIS PROJECT. THE BUDGET RANGE IS 20.0% TO 100.0%, IN STEPS OF 10.0%.

INPUT DATA(FOR 100% FUNDING):

TOTAL ACRES	=	110.500
TOTAL BLDG. BEFORE DISASTER	=	310.000
TOTAL BLDG. DESTROYED	=	0.0
TOTAL BLDG. DAMAGED	=	237.000
RES. ACREAGE (DWELLING)	=	46.700
RES. ACREAGE (RELATED)	=	0.350
TOTAL RES. BLDG.	=	273.000
TOTAL RES. BLDG. DESTROYED	=	0.0
TOTAL RES. BLDG. DAMAGED	=	210.000
NONRES. ACREAGE	=	27.030
TOTAL NONRES. BLDG.	=	37.000
TOTAL NONRES. BLDG. DESTROYED	=	0.0
TOTAL NONRES. BLDG. DAMAGED	=	27.000
VACANT OR UNIMPROVED ACREAGE	=	9.430
DWELLING UNITS BEFORE FLOOD	=	306.000
UNUSABLE BUT REPARBL(NON-MIN)	=	0.0
UNUSABLE BUT REPARBL(MINORTY)	=	0.0
USABLE(NON-MINORITY)	=	306.000
USABLE(MINORITY)	=	0.0
TOTAL FAMILIES REMAINING	=	306.000
TOTAL NON-MIN FAMILIES	=	306.000
TOTAL MINORITY FAMILIES	=	0.0
PROJECT COST	=	$ 6.265 MILLION.

TABLE D-70
DATA FOR TYRONE BORO, BLAIR

PROJECT NUMBER 70
TYRONE BORO, BLAIR

THERE ARE 9 VARIATIONS FOR THIS PROJECT. THE BUDGET RANGE IS 20.0% TO 100.0%, IN STEPS OF 10.0%.

INPUT DATA(FOR 100% FUNDING):

TOTAL ACRES	=	53.800
TOTAL BLDG. BEFORE DISASTER	=	297.000
TOTAL BLDG. DESTROYED	=	0.0
TOTAL BLDG. DAMAGED	=	257.000
RES. ACREAGE (DWELLING)	=	19.590
RES. ACREAGE (RELATED)	=	0.0
TOTAL RES. BLDG.	=	224.000
TOTAL RES. BLDG. DESTROYED	=	0.0
TOTAL RES. BLDG. DAMAGED	=	195.000
NONRES. ACREAGE	=	11.420
TOTAL NONRES. BLDG.	=	73.000
TOTAL NONRES. BLDG. DESTROYED	=	0.0
TOTAL NONRES. BLDG. DAMAGED	=	62.000
VACANT OR UNIMPROVED ACREAGE	=	1.360
DWELLING UNITS BEFORE FLOOD	=	262.000
UNUSABLE BUT REPARBL(NON-MIN)	=	48.000
UNUSABLE BUT REPARBL(MINORITY)	=	0.0
USABLE(NON-MINORITY)	=	214.000
USABLE(MINORITY)	=	0.0
TOTAL FAMILIES REMAINING	=	214.000
TOTAL NON-MIN FAMILIES	=	214.000
TOTAL MINORITY FAMILIES	=	0.0
PROJECT COST	=	$ 2.787 MILLION.

TABLE D-71
DATA FOR WILLIAMSBURG, BLAIR

PROJECT NUMBER 71
WILLIAMSBURG, BLAIR

THERE ARE 9 VARIATIONS FOR THIS PROJECT. THE BUDGET RANGE IS 20.0% TO 100.0%, IN STEPS OF 10.0%.

INPUT DATA(FOR 100% FUNDING):

TOTAL ACRES	=	94.540
TOTAL BLDG. BEFORE DISASTER	=	221.000
TOTAL BLDG. DESTROYED	=	0.0
TOTAL BLDG. DAMAGED	=	192.000
RES. ACREAGE (DWELLING)	=	33.690
RES. ACREAGE (RELATED)	=	0.900
TOTAL RES. BLDG.	=	195.000
TOTAL RES. BLDG. DESTROYED	=	0.0
TOTAL RES. BLDG. DAMAGED	=	170.000
NONRES. ACREAGE	=	33.290
TOTAL NONRES. BLDG.	=	26.000
TOTAL NONRES. BLDG. DESTROYED	=	0.0
TOTAL NONRES. BLDG. DAMAGED	=	22.000
VACANT OR UNIMPROVED ACREAGE	=	2.820
DWELLING UNITS BEFORE FLOOD	=	211.000
UNUSABLE BUT REPARBL(NON-MIN)	=	22.000
UNUSABLE BUT REPARBL(MINORTY)	=	0.0
USABLE(NON-MINORITY)	=	189.000
USABLE(MINORITY)	=	0.0
TOTAL FAMILIES REMAINING	=	189.000
TOTAL NON-MIN FAMILIES	=	189.000
TOTAL MINORITY FAMILIES	=	0.0
PROJECT COST	=	$ 3.210 MILLION.

TABLE D-72
DATA FOR HUNTINGDON, HUNTINGDON

PROJECT NUMBER 72
HUNTINGDON, HUNTINGDON

THERE ARE 9 VARIATIONS FOR THIS PROJECT. THE BUDGET RANGE IS 20.0% TO 100.0%, IN STEPS OF 10.0%.

INPUT DATA(FOR 100% FUNDING):

TOTAL ACRES	=	20.900
TOTAL BLDG. BEFORE DISASTER	=	32.000
TOTAL BLDG. DESTROYED	=	0.0
TOTAL BLDG. DAMAGED	=	32.000
RES. ACREAGE (DWELLING)	=	5.070
RES. ACREAGE (RELATED)	=	0.0
TOTAL RES. BLDG.	=	22.000
TOTAL RES. BLDG. DESTROYED	=	0.0
TOTAL RES. BLDG. DAMAGED	=	22.000
NONRES. ACREAGE	=	10.760
TOTAL NONRES. BLDG.	=	10.000
TOTAL NONRES. BLDG. DESTROYED	=	0.0
TOTAL NONRES. BLDG. DAMAGED	=	10.000
VACANT OR UNIMPROVED ACREAGE	=	2.520
DWELLING UNITS BEFORE FLOOD	=	25.000
UNUSABLE BUT REPARBL(NON-MIN)	=	0.0
UNUSABLE BUT REPARBL(MINORTY)	=	0.0
USABLE(NON-MINORITY)	=	20.000
USABLE(MINORITY)	=	1.000
TOTAL FAMILIES REMAINING	=	0.0
TOTAL NON-MIN FAMILIES	=	0.0
TOTAL MINORITY FAMILIES	=	0.0
PROJECT COST	= $	1.975 MILLION.

TABLE D-73
DATA FOR MT. UNION, HUNTINGTON

PROJECT NUMBER 73
MT. UNION, HUNTINGTON

THERE ARE 9 VARIATIONS FOR THIS PROJECT. THE BUDGET RANGE IS 20.0% TO 100.0%, IN STEPS OF 10.0%.

INPUT DATA(FOR 100% FUNDING):

TOTAL ACRES	=	206.890
TOTAL BLDG. BEFORE DISASTER	=	270.000
TOTAL BLDG. DESTROYED	=	0.0
TOTAL BLDG. DAMAGED	=	187.000
RES. ACREAGE (DWELLING)	=	43.450
RES. ACREAGE (RELATED)	=	0.270
TOTAL RES. BLDG.	=	242.000
TOTAL RES. BLDG. DESTROYED	=	0.0
TOTAL RES. BLDG. DAMAGED	=	168.000
NONRES. ACREAGE	=	123.140
TOTAL NONRES. BLDG.	=	28.000
TOTAL NONRES. BLDG. DESTROYED	=	0.0
TOTAL NONRES. BLDG. DAMAGED	=	19.000
VACANT OR UNIMPROVED ACREAGE	=	13.520
DWELLING UNITS BEFORE FLOOD	=	227.000
UNUSABLE BUT REPARBL(NON-MIN)	=	21.000
UNUSABLE BUT REPARBL(MINORTY)	=	14.000
USABLE(NON-MINORITY)	=	101.000
USABLE(MINORITY)	=	64.000
TOTAL FAMILIES REMAINING	=	110.000
TOTAL NON-MIN FAMILIES	=	110.000
TOTAL MINORITY FAMILIES	=	0.0
PROJECT COST	=	$ 6.302 MILLION.

TABLE D-74
DATA FOR SMITHFIELD, HUNTINGDON

PROJECT NUMBER 74
SMITHFIELD, HUNTINGDON

THERE ARE 9 VARIATIONS FOR THIS PROJECT. THE BUDGET RANGE IS 20.0% TO 100.0%, IN STEPS OF 10.0%.

INPUT DATA(FOR 100% FUNDING):

TOTAL ACRES	=	175.910
TOTAL BLDG. BEFORE DISASTER	=	311.000
TOTAL BLDG. DESTROYED	=	1.000
TOTAL BLDG. DAMAGED	=	260.000
RES. ACREAGE (DWELLING)	=	70.220
RES. ACREAGE (RELATED)	=	1.980
TOTAL RES. BLDG.	=	278.000
TOTAL RES. BLDG. DESTROYED	=	1.000
TOTAL RES. BLDG. DAMAGED	=	237.000
NONRES. ACREAGE	=	31.630
TOTAL NONRES. BLDG.	=	33.000
TOTAL NONRES. BLDG. DESTROYED	=	0.0
TOTAL NONRES. BLDG. DAMAGED	=	23.000
VACANT OR UNIMPROVED ACREAGE	=	27.400
DWELLING UNITS BEFORE FLOOD	=	284.000
UNUSABLE BUT REPARBL(NON-MIN)	=	31.000
UNUSABLE BUT REPARBL(MINORTY)	=	3.000
USABLE(NON-MINORITY)	=	231.000
USABLE(MINORITY)	=	23.000
TOTAL FAMILIES REMAINING	=	166.000
TOTAL NON-MIN FAMILIES	=	150.000
TOTAL MINORITY FAMILIES	=	16.000
PROJECT COST	= $	7.492 MILLION.

TABLE D-75
DATA FOR ELDRED, MCKEAN

PROJECT NUMBER 75
ELDRED, MCKEAN

THERE ARE 9 VARIATIONS FOR THIS PROJECT. THE BUDGET RANGE IS 20.0% TO 100.0%, IN STEPS OF 10.0%.

INPUT DATA(FOR 100% FUNDING):

TOTAL ACRES	=	266.100
TOTAL BLDG. BEFORE DISASTER	=	208.000
TOTAL BLDG. DESTROYED	=	20.000
TOTAL BLDG. DAMAGED	=	173.000
RES. ACREAGE (DWELLING)	=	57.200
RES. ACREAGE (RELATED)	=	14.000
TOTAL RES. BLDG.	=	162.000
TOTAL RES. BLDG. DESTROYED	=	16.000
TOTAL RES. BLDG. DAMAGED	=	131.000
NONRES. ACREAGE	=	27.100
TOTAL NONRES. BLDG.	=	46.000
TOTAL NONRES. BLDG. DESTROYED	=	4.000
TOTAL NONRES. BLDG. DAMAGED	=	42.000
VACANT OR UNIMPROVED ACREAGE	=	143.700
DWELLING UNITS BEFORE FLOOD	=	178.000
UNUSABLE BUT REPARBL(NON-MIN)	=	131.000
UNUSABLE BUT REPARBL(MINORTY)	=	0.0
USABLE(NON-MINORITY)	=	15.000
USABLE(MINORITY)	=	0.0
TOTAL FAMILIES REMAINING	=	178.000
TOTAL NON-MIN FAMILIES	=	178.000
TOTAL MINORITY FAMILIES	=	0.0
PROJECT COST	=	$ 0.616 MILLION.

TABLE D-76
DATA FOR KEATING, MCKEAN

PROJECT NUMBER 76
KEATING, MCKEAN

THERE ARE 9 VARIATIONS FOR THIS PROJECT. THE BUDGET RANGE IS 20.0% TO 100.0%, IN STEPS OF 10.0%.

INPUT DATA(FOR 100% FUNDING):

TOTAL ACRES	=	23.400
TOTAL BLDG. BEFORE DISASTER	=	16.000
TOTAL BLDG. DESTROYED	=	8.000
TOTAL BLDG. DAMAGED	=	8.000
RES. ACREAGE (DWELLING)	=	9.400
RES. ACREAGE (RELATED)	=	0.0
TOTAL RES. BLDG.	=	13.000
TOTAL RES. BLDG. DESTROYED	=	8.000
TOTAL RES. BLDG. DAMAGED	=	5.000
NONRES. ACREAGE	=	2.600
TOTAL NONRES. BLDG.	=	3.000
TOTAL NONRES. BLDG. DESTROYED	=	0.0
TOTAL NONRES. BLDG. DAMAGED	=	3.000
VACANT OR UNIMPROVED ACREAGE	=	10.300
DWELLING UNITS BEFORE FLOOD	=	13.000
UNUSABLE BUT REPARBL(NON-MIN)	=	5.000
UNUSABLE BUT REPARBL(MINORTY)	=	0.0
USABLE(NON-MINORITY)	=	0.0
USABLE(MINORITY)	=	0.0
TOTAL FAMILIES REMAINING	=	13.000
TOTAL NON-MIN FAMILIES	=	13.000
TOTAL MINORITY FAMILIES	=	0.0
PROJECT COST	= $	0.165 MILLION.

TABLE D-77
DATA FOR PORT ALLEGANY, MCKEAN

PROJECT NUMBER 77
PORT ALLEGANY, MCKEAN

THERE ARE 9 VARIATIONS FOR THIS PROJECT. THE BUDGET RANGE IS 20.0% TO 100.0%, IN STEPS OF 10.0%.

INPUT DATA(FOR 100% FUNDING):

TOTAL ACRES	=	258.700
TOTAL BLDG. BEFORE DISASTER	=	177.000
TOTAL BLDG. DESTROYED	=	18.000
TOTAL BLDG. DAMAGED	=	125.000
RES. ACREAGE (DWELLING)	=	29.500
RES. ACREAGE (RELATED)	=	2.200
TOTAL RES. BLDG.	=	99.000
TOTAL RES. BLDG. DESTROYED	=	11.000
TOTAL RES. BLDG. DAMAGED	=	61.000
NONRES. ACREAGE	=	71.300
TOTAL NONRES. BLDG.	=	78.000
TOTAL NONRES. BLDG. DESTROYED	=	7.000
TOTAL NONRES. BLDG. DAMAGED	=	64.000
VACANT OR UNIMPROVED ACREAGE	=	136.400
DWELLING UNITS BEFORE FLOOD	=	148.000
UNUSABLE BUT REPARBL(NON-MIN)	=	91.000
UNUSABLE BUT REPARBL(MINORTY)	=	0.0
USABLE(NON-MINORITY)	=	33.000
USABLE(MINORITY)	=	0.0
TOTAL FAMILIES REMAINING	=	148.000
TOTAL NON-MIN FAMILIES	=	148.000
TOTAL MINORITY FAMILIES	=	0.0
PROJECT COST	=	$ 0.574 MILLION.

TABLE D-78
DATA FOR SMETHPORT, MCKEAN

PROJECT NUMBER 78
SMETHPORT, MCKEAN

THERE ARE 9 VARIATIONS FOR THIS PROJECT. THE BUDGET RANGE IS 20.0% TO 100.0%, IN STEPS OF 10.0%.

INPUT DATA(FOR 100% FUNDING):

TOTAL ACRES	=	187.700
TOTAL BLDG. BEFORE DISASTER	=	119.000
TOTAL BLDG. DESTROYED	=	6.000
TOTAL BLDG. DAMAGED	=	94.000
RES. ACREAGE (DWELLING)	=	30.600
RES. ACREAGE (RELATED)	=	22.200
TOTAL RES. BLDG.	=	99.000
TOTAL RES. BLDG. DESTROYED	=	3.000
TOTAL RES. BLDG. DAMAGED	=	78.000
NONRES. ACREAGE	=	19.800
TOTAL NONRES. BLDG.	=	20.000
TOTAL NONRES. BLDG. DESTROYED	=	3.000
TOTAL NONRES. BLDG. DAMAGED	=	16.000
VACANT OR UNIMPROVED ACREAGE	=	96.500
DWELLING UNITS BEFORE FLOOD	=	108.000
UNUSABLE BUT REPARBL(NON-MIN)	=	75.000
UNUSABLE BUT REPARBL(MINORTY)	=	0.0
USABLE(NON-MINORITY)	=	23.000
USABLE(MINORITY)	=	0.0
TOTAL FAMILIES REMAINING	=	105.000
TOTAL NON-MIN FAMILIES	=	105.000
TOTAL MINORITY FAMILIES	=	0.0
PROJECT COST	=	$ 0.282 MILLION.

TABLE D-79
DATA FOR CORAOPOLIS, ALLEGHENY

PROJECT NUMBER 79
CORAOPOLIS, ALLEGHENY

THERE ARE 9 VARIATIONS FOR THIS PROJECT. THE BUDGET RANGE IS 20.0% TO 100.0%, IN STEPS OF 10.0%.

INPUT DATA(FOR 100% FUNDING):

TOTAL ACRES	=	170.800
TOTAL BLDG. BEFORE DISASTER	=	454.000
TOTAL BLDG. DESTROYED	=	0.0
TOTAL BLDG. DAMAGED	=	454.000
RES. ACREAGE (DWELLING)	=	30.700
RES. ACREAGE (RELATED)	=	8.500
TOTAL RES. BLDG.	=	368.000
TOTAL RES. BLDG. DESTROYED	=	0.0
TOTAL RES. BLDG. DAMAGED	=	368.000
NONRES. ACREAGE	=	80.900
TOTAL NONRES. BLDG.	=	86.000
TOTAL NONRES. BLDG. DESTROYED	=	0.0
TOTAL NONRES. BLDG. DAMAGED	=	86.000
VACANT OR UNIMPROVED ACREAGE	=	25.700
DWELLING UNITS BEFORE FLOOD	=	466.000
UNUSABLE BUT REPARBL(NON-MIN)	=	6.000
UNUSABLE BUT REPARBL(MINORTY)	=	10.000
USABLE(NON-MINORITY)	=	260.000
USABLE(MINORITY)	=	114.000
TOTAL FAMILIES REMAINING	=	440.000
TOTAL NON-MIN FAMILIES	=	324.000
TOTAL MINORITY FAMILIES	=	116.000
PROJECT COST	=	$ 9.187 MILLION.

TABLE D-80
DATA FOR MCKEESPORT, ALLEGHENY

PROJECT NUMBER 80
MCKEESPORT, ALLEGHENY

THERE ARE 9 VARIATIONS FOR THIS PROJECT. THE BUDGET RANGE IS 20.0% TO 100.0%, IN STEPS OF 10.0%.

INPUT DATA(FOR 100% FUNDING):

TOTAL ACRES	=	95.030
TOTAL BLDG. BEFORE DISASTER	=	463.000
TOTAL BLDG. DESTROYED	=	0.0
TOTAL BLDG. DAMAGED	=	445.000
RES. ACREAGE (DWELLING)	=	33.250
RES. ACREAGE (RELATED)	=	3.370
TOTAL RES. BLDG.	=	376.000
TOTAL RES. BLDG. DESTROYED	=	0.0
TOTAL RES. BLDG. DAMAGED	=	363.000
NONRES. ACREAGE	=	36.250
TOTAL NONRES. BLDG.	=	92.000
TOTAL NONRES. BLDG. DESTROYED	=	0.0
TOTAL NONRES. BLDG. DAMAGED	=	82.000
VACANT OR UNIMPROVED ACREAGE	=	0.670
DWELLING UNITS BEFORE FLOOD	=	710.000
UNUSABLE BUT REPARBL(NON-MIN)	=	0.0
UNUSABLE BUT REPARBL(MINORTY)	=	0.0
USABLE(NON-MINORITY)	=	360.000
USABLE(MINORITY)	=	350.000
TOTAL FAMILIES REMAINING	=	550.000
TOTAL NON-MIN FAMILIES	=	275.000
TOTAL MINORITY FAMILIES	=	275.000
PROJECT COST	=	$ 12.947 MILLION.

APPENDIX E

"IDEALIZED" LIST OF URBAN RENEWAL PARAMETERS

The initial effort in the conduct of the disaster urban renewal analysis was to define a set of parameters to be used in developing values for analyzing the Disaster Urban Renewal Projects. The list is presented in this appendix. When it became apparent that the data necessary to use these parameters were not available, a second set of parameters was defined. The second set of parameters, described in Section III, provided the basis for the analysis.

The list of parameters presented here should be reviewed and those which are considered relevant should be incorporated into any effort to refine the analysis presented in Section III. The list is based primarily on a detailed review of criteria specified in the HUD Urban Renewal Handbook. Most of the criteria presented in the handbook was developed for "normal" urban renewal project evaluation. As a result, when deficiencies were observed, additional criteria were identified and parameters were defined.

The parameters fall into four broad categories:

(a) Housing
(b) Relocation
(c) Employment
(d) Social problems.

Each category consists of several elements. Each element in turn is separated into a group of parameters.

HOUSING

The housing category consists of the following five elements:

(a) Low and moderate income housing supply
(b) Number of buildings to be cleared

(c) Number of buildings to be rehabilitated

(d) Number of units to be built

(d) Deficiencies.

The parameters for each element are defined below.

Low and Moderate Income Housing Supply

(a) Availability

Portion of net acreage for low and moderate income families after redevelopment, or

Portion of housing units in a clearance site for low and moderate income families after redevelopment.

(b) Expansion

$$\frac{\text{Portion of net acreage for low and moderate income housing after redevelopment}}{\text{Portion of net acreage for low and moderate income housing before redevelopment}}, \text{ or}$$

$$\frac{\text{Portion of low and moderate income housing available after redevelopment}}{\text{Portion of low and moderate income housing available before redevelopment}}$$

Number of Buildings to be Cleared

(a) Portion of buildings to be cleared which are structurally substandard and infeasible to rehabilitate

(b) Portion of buildings to be cleared to remove blighting influence (and which do not fall in element (a))

(c) Portion of buildings to be cleared to achieve specific plan objectives, such as change in land use, etc., (and which do not fall in elements (a) or (b)).

Number of Buildings to be Rehabilitated

(a) Portion of buildings to be rehabilitated

(b) Portion of owner-occupied, one-to-four dwelling unit properties to be rehabilitated

(c) Portion of these owner-occupied properties which are owned and occupied by low income families

(d) Portion of these owner-occupied properties which are owned and occupied by families which are not low income (greater than $3000 annually) and who may be eligible to receive rehabilitation grants

(e) Portion of buildings of historical or architectural value in the area.

Number of Units to be Built

(a) Portion of rental units to be built
(b) Portion of low income rental units to be built
(c) Portion of private (owner-occupied) units to be built
(d) Portion of low income private (owner-occupied) units to be built.

Deficiencies

(a) Portion of buildings with at least one building deficiency as defined in RHM 7205.1, Chapter 1
(b) Portion of environmental deficiencies as defined in RHM 7205.1, Chapter 1 (do not count same type of deficiency more than once)
(c) Portion of the area without one building deficiency or two environmental deficiencies.

RELOCATION

The category of Relocation consists of the following six elements:

(a) Relocation requirements
(b) Availability of relocation housing
(c) Insufficient housing
(d) Temporary housing
(e) Relocation standards
(f) Minority relocation

The parameters associated with each element are given below.

Relocation Requirements

(a) Portion of families to be relocated
(b) Portion of low income families to be relocated
(c) Portion of small businesses to be relocated
(d) Portion of small businesses eligible for relocation payments

Availability of Relocation Housing

(a) Portion of new private units required
    (1) Number of bedrooms
    (2) Price
    (3) Type (own or rent)
(b) Portion of private units under construction
    (1) Number of bedrooms
    (2) Price
    (3) Estimated date of availability
    (4) Type (own or rent)
(c) Portion of public units available
    (1) Number of bedrooms
    (2) Turn-over rate

(d) Portion of additional public units contemplated or under construction

(1) Number of bedrooms

(2) Estimated date of availability

Insufficient Housing

(a) Portion of additional housing required

(1) Number of bedrooms

(2) Price

(3) Type (own or rent)

(b) Portion of additional low income housing required

(1) Number of bedrooms

(2) Price

(3) Type (own or rent)

(c) Availability of subsidies for low income families when low income housing is not available.

Relocation Standards

(a) Portion of relocation housing not meeting all of the following standards

(1) Cooking

(2) Heating

(3) Lighting

(4) Bath

(5) Occupational density

(6) Structural

(b) Portion of relocation housing which allows good accesssibility to jobs

(c) Portion of relocation housing which allows good accessibility to schools

(d) Portion of relocation housing which allows good accessibility to commercial facilities.

Temporary Housing

(a) Portion of families requiring temporary housing

(b) Duration of temporary housing

(c) Portion of temporary housing meeting each of the standards listed under Relocation Standards.

Minority Relocation

(a) Portion of minority families in total families being relocated

(b) Portion of minority families in the neighborhood to which the minority family is being relocated

(c) Portion of minorities in schools in the neighborhood to which the minority family is being relocated.

EMPLOYMENT

The following elements are used to evaluate employment:

(a) Employment situation

(b) New jobs.

A list of the parameters for each element are given below.

Employment Situation

(a) Unemployment

(1) Portion of unemployed persons in area

(2) Ratio of the portion of underemployed in area to the community average

(3) Ratio of the portion of underemployed in area to the national average

(b) Underemployment

(1) Portion of underemployed persons in area

(2) Ratio of the portion of underemployed in area to the community average

(3) Ratio of the portion of underemployed in area to the national average

(c) Low income families

(1) Portion of low income families in the area

(2) Ratio of the portion of low income families in the area to the community average

(3) Ratio of the portion of low income families in the area to the national average.

New Jobs

(a) Availability of jobs

(1) Permanent

(2) Temporary

(b) Linkage of jobs to unemployed and underemployed

(1) Portion of unemployed or underemployed eligible for new jobs

(2) Availability of job training

(3) Availability of job counseling

(4) Availability of job recruiting

(5) Availability of job placement efforts

(c) Accessibility of new job area to low income areas in the community.

SOCIAL PROBLEMS

The social problems elements are as follows:

(a) Personal space

(b) Minorities

(c) Health

(d) Education

(e) Recreation

(f) Fire and Crime

(g) Flood Prevention.

Personal Space

(a) Occupancy ratio of the average number of occupants per room in the area to standard occupancy rate

(b) Excessive dwellings

(1) The ratio of square feet of open space to the square feet of floor space in the area

(2) The ratio of square feet of non-vehicular outdoor space to the square feet of floor space in the area

(c) Portion of buildings which have been converted to incompatible use in the area

(d) Portion of housing units fronting on poorly maintained streets and sidewalks (includes lighting)

(e) Portion of acreage converted to detrimental land use.

Minorities

(a) Portion of minority persons in the project area before redevelopment

(b) Portion of minority persons in the project area after redevelopment

(c) Portion of minority persons in project area schools before redevelopment

(d) Portion of minority persons in project area schools after redevelopment.

Health

(a) Ratio of the population in the community per doctor to the population in the project area per doctor both before and after redevelopment

(b) Ratio of the population in this community per dentist to the population in the project area per dentist before and after redevelopment

(c) Ratio of population in the community per bed (or number of emergency services) to the population in the project area per bed (or emergency services) before and after redevelopment

(d) Ratio of the number of infant (or maternal) deaths in the community per 100,000 live births to the number of infant (or maternal) deaths in the redevelopment area per 100,000 live births before and after redevelopment

(e) Same as (d), except that the national average is used rather than the community average

(f) Ratio of the number of houses with inadequate refuse collection to the total number of households, before and after redevelopment

(g) Portion of buildings with rat infestation

(h) Ability of sewer system to control storm and sanitary wastes before and after redevelopment.

Education

(a) Ratio of portion of people in area graduating grade school to portion of people in community graduating grade school

(b) Same as (a), except consider portion of high school graduates

(c) Same as (a), except consider portion of persons going to college

(d) Same as (a), (b), and (c) except relate redevelopment area to national average.

Recreation

(a) Acres of recreational land per 1,000 people

(b) Number of recreational facilities in the area

(c) Accessibility to recreational facilities

(d) Average cost of usage of the facilities

(e) Variety of types of recreational facilities

(f) Portion of population in area using the facilities.

These parameters should be determined before and after redevelopment.

Fire and Crime

(a) Ratio of street crime per 1,000 persons in area to street crime per 1,000 persons in community

(b) Ratio of crimes in homes in the area per 1,000 units to the crimes in homes in the community per 1,000 units

(c) Ratio of the number of fires in the area per 1,000 of population to the number of fires in the community per 1,000 of population.

Flood Prevention

(a) Portion of dwellings subject to flooding before and after redevelopment

(b) Portion of area acreage subject to flooding before and after redevelopment

(c) Portion of buildings subject to flooding before and after redevelopment.

APPENDIX F
DATA SOURCES

APPROACH

Based upon the data base design, a set of potential sources were identified and information on the data available from each source was collected through interviews and through reviews of available documentation.

For discussion purposes the potential data sources are separated into four groups:

(a) Federal agencies
(b) State agencies
(c) Local governments
(d) Other.

FEDERAL AGENCIES

Ten federal agencies were involved in the immediate disaster recovery effort. Three of these agencies, the Office of Emergency Preparedness (OEP), the Small Business Administration (SBA), and the Department of Transportation's Federal Highway Administration (FHWA), accounted for more than 90% of the total Federal obligations and expenditures.

Figure F-1 shows the federal agencies and their relationships to each other and to the Commonwealth of Pennsylvania. In general, agencies which provided funds for the recovery effort either administered their programs or delegated the administration to a state agency which had an existing delivery system. The one exception to this is OEP, which delegated some of the administration to other federal agencies. Identifying the agency responsible for administering a project or program is important because it is this agency which is responsible for collecting and maintaining the detailed data needed to justify expenditures.

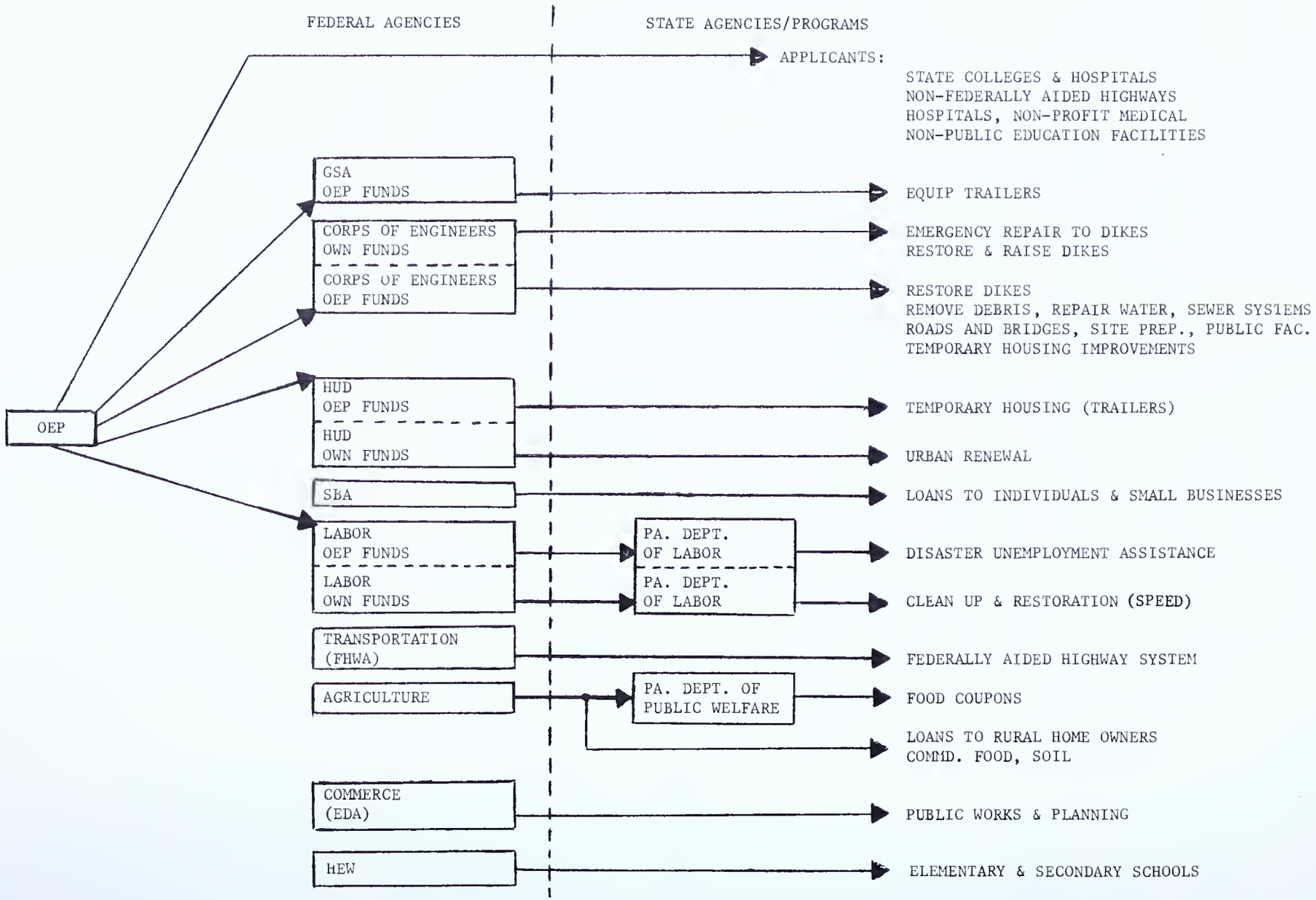

FIGURE F-1
FEDERAL INVOLVEMENT IN AGNES RECOVERY

OEP is responsible for coordination of federal activities and disbursement of funds under The Disaster Relief Act of 1970 (PL 91-606). In managing this effort, OEP delegated responsibility via blanket mission assignments to four federal agencies: the U.S. Army Corps of Engineers (COE), the U.S. Department of Housing and Urban Development (HUD), the General Services Administration and the U.S. Department of Labor. OEP administered all Project Applications, i.e., requests for PL 91-606 federal funds from authorized applicants. Three of the four agencies which received blanket mission assignments from OEP also administered programs of their own. This is indicated in Figure F-1 and identified as either OEP funds or internal (own) funds.

In two cases, federal agencies assigned responsibility for administering their programs to state agencies. The U.S. Department of Labor assigned the Disaster Unemployment Assistance (DUA) Program and the Special Program for Emergency Employment Development to the Pennsylvania Department of Labor and Industry and the Department of Agriculture assigned the Food Coupon Program to the Pennsylvania Department of Public Welfare.

Office of Emergency Preparedness

The Office of Emergency Preparedness has the responsibility for managing the funds available to disaster areas under the Disaster Relief Act of 1970 (PL 91-606) and emergency appropriations for Agnes relief (PL 92-385). Several classes of expenditures covered by these two laws are assigned to other federal agencies for administration. In general, the agency which is assigned the responsibility of accomplishing a program also maintains a data base to justify the expenditures. As a result, details regarding the expenditure of portions of PL 91-606 funds must be obtained from the following agencies:

(a) Department of the Army, Corps of Engineers

(b) Department of Housing and Urban Development

(c) Department of Commerce

(d) General Services Administration.

All funds available under PL 92-385 and the funds under PL 91-606 were administered by OEP. The procedure for administering these funds is as follows. Immediately after the flood, teams of experts surveyed all damage which potentially would be covered by OEP funds and prepared and filed Damage Survey Reports (DSR's). Approximately 18,000 damage reports were prepared for Pennsylvania. These reports provide the basis for each eligible applicant to submit a Project Application to the state and OEP for approval. OEP notified the applicant when his Project Application was approved and forwarded advance funds if requested. Additional funds were provided as progress is made on the project.

Data contained on the Project Application and information pertaining to OEP expenditures are maintained by OEP in an automated data base. The Project Application data base contains the following information for each application:

(a) Project Application Identification Number

(b) Name of Applicant

(c) Country

(d) Congressional District

(e) Date of Request

(f) Amount of funds requested by applicant and approved by state by category of work

(g) Amount approved by OEP by category of work

(h) Sum of approved dollars and date.

The category of work mentioned in items (f) and (g) consist of the following 11 categories[170]:

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[170] For a definition of these categories see OEP Circular 4000.5C, Federal Disaster Assistance Program, Manual for Applicant, February 1971.

(a) Debris Clearance

(b) Protective Measures

(c) Streets and Roads - Emergency

(d) Streets and Roads - Permanent

(e) Dikes, Levees, etc. - Emergency

(f) Dikes, Levees, etc. - Permanent

(g) Public Buildings - Emergency

(h) Public Buildings - Permanent

(i) Public Utilities - Emergency

(j) Public Utilities - Permanent

(k) Facilities under Construction.

In some of these reports OEP has included two additional categories -- private non-profit medical care facilities and private non-profit educational institutions. Since OEP's data base did not contain this information in a separate identifiable form, these categories of work had to be identified and developed manually.

In addition to the Project Application data, OEP maintains a data base of disbursements. This data base contains the following information for each Project Application:

(a) Project Application Identification Number

(b) Voucher Number

(c) Amount

(d) Date.

A combination of both data bases provides a basis for developing damage and recovery expenditures for those itmes covered by PL 91-606.

CONTACTS: Lloyd Jenson, Long Range Recovery, (202) 395-6111
Jim Lewis, Public Assistance, (202) 395-6111
Burt Lawe, Individual Assistance, (202) 395-6133
Robbie Roberson, ADP, (202) 395-6125
Larry Garcia, ADP, (202) 395-6125.

Department of the Army

The U.S. Army Corps of Engineers (COE) performed flood recovery work under the authority of two public laws, PL 84-99 and PL 91-606. The PL 84-99 work consisted of emergency assistance to supplement local efforts (12.103) and emergency repairs to damaged flood control projects (12.102)[171]. The PL 91-606 work was performed by COE for OEP under authorization provided by the Disaster Relief Act of 1970 and the Federal Disaster Assistance Regulations of OEP. A majority of this effort was performed under contract to local construction firms. COE has maintained a date file containing the following information on each contract:

(a) PL number
(b) Contract number
(c) Contractor
(d) Location
(e) Start date
(f) Amount of contract
(g) Percent complete
(h) Finish date
(i) Job type
(j) COE district.

The PL 91-606 work performed by the COE was based upon mission assignment from the Office of Emergency Preparedness. Two types of mission assignments were used. The first were blanket assignments under which the COE performed work they deemed necessary. This type of assignment accounted for approximately 95% of the total work performed by the COE. The second type of assignment was via Project Applications. Approved Project Applications (Form OEP152) were forwarded to the COE for their execution.

[171] Numbers refer to programs identified in 1972 catalog of Federal Domestic Assistance.

The COE classified their efforts into the following job types:

(a) Debris Removal

(b) Water

(c) Sewer

(d) Roads and Bridges

(e) Site preparation

(f) Public facilities

(g) Dikes and Levees

(h) Miscellaneous

(i) Temporary repair to housing.

The PL 91-606 contracts are further classified by type of mission assignment, i.e., blanket assignment or Project Application. The OEP Project Application data base includes all Project Application costs. Blanket mission assignment costs can only be collected from COE.

The COE data base is available on punched cards and can be easily processed for the development of the Flood Damage/Recovery Data Base. In addition, the data base is updated weekly to reflect progress made toward completing the contracts. Although, the COE data base is current and is in a form which would permit its use at low cost, it has two drawbacks:

- It does not include all in-house costs and therefore underestimates total costs
- It cannot be separated by county.

The first problem is minor. As mentioned earlier, most of the work was performed by local contractors under contract to the COE. Those projects which were done with in-house resources consisted of supplying and installing Bailey Bridges. These efforts were in many cases viewed as training exercises and as a result were performed at no charge. In-house administrative costs are also not included.

The second problem is significant. As indicated above, the COE data base only identifies the COE district office responsible for the work. A breakout of damage costs by county would require a manual review of the contracts at the District COE offices. At present there are 3,130 contracts for Pennsylvania. If the county information is gathered, it can be easily added to the COE data base--unused space is available on the contract data card.

The COE has contracted with Gannett, Flemming, Corddry and Carpenter of Harrisburg to compile a Flood Damage data base for them. The effort will be completed in January, 1974. OSPD may wish to monitor the progress and status of this effort.

CONTACTS: Bill MacNamera, Flood Emergency, (301) 962-2504
Rudy Walter, ADP, (301) 962-3997
Glen Casino, ADP, (301) 962-3997
Dave Bagget, Harrisburg Office, (717) 782-3750.

Department of Housing and Urban Development

The Department of Housing and Urban Development (HUD) is involved in the disaster recovery program through temporary housing support and urban renewal programs. More than 20,000 families were eligible under the HUD Temporary Housing Regulations for temporary housing. More than 14,000 of these families are in Luzerne and Columbia counties. Of this number nearly 7,000 were in mobile homes, 2,000 were in travel trailers, and 3,000 were in government provided non-mobile houses. More than 2,000 were back in their own homes after repairs had been made under the Temporary Housing Repair Program (the Mini-Repair Program) conducted by the Corps of Engineers.

HUD is presently developing a computerized data base which will consist of the following:

(a) mobile home information file
(b) mobile home maintenance file
(c) social/economic data on mobile home residents.

The information contained in the data base is being obtained from the following sources:

(a) actual HUD expenditures

(b) temporary housing applications

(c) several surveys conducted since the flood.

It appears that once completed, the data base will provide valuable social/economic information on a portion of the families affected by the flood.

The longer term HUD flood recovery effort is urban renewal. $400 million of HUD urban renewal funds were announced on October 20, 1972 and an operations office for the HUD urban renewal program was established in Scranton. The HUD program consists of three phases. Phase One consisted of the survey and planning application effort. Most of this Phase One was completed by early November. Phase Two involved the attainment of Federal Flood Insurance qualification for the communities applying for urban renewal funds. The Phase Two effort is scheduled for completion around the first of April, 1973. The third phase is termed the Midplanning Review Phase in which loan and grant applications are reviewed; urban renewal plans adopted; urban renewal grant contracts offered; and contracts signed.

Information and data regarding the status and progress of the urban renewal program can be obtained from the HUD Housing Situation Room in Scranton.

CONTACTS: John Gibson, Manager, Operations for Disasters, (202) 755-6860
Amy Jones, Operations for Disasters, (202) 755-6860
Bob Scalia, Urban Renewal, Scranton, (717) 961-5351
Richard Krim, Federal Flood Insurance Program, (202) 255-5581
Joseph Coughlin, Federal Flood Insurance Program, DCA, (717) 787-7400.

Department of Commerce

Disaster assistance is given by the Economic Development Administration (EDA) of the Department of Commerce through three programs:

(a) Public Works Impact Program (PWIP)

(b) Long Term Public Works Program

(c) Technical Assistance (TA) Program.

All of these programs are used to create employment in the flood stricken areas. During the Agnes flood recovery effort these programs were administered from two sub-regional offices in Wilkes-Barre and Harrisburg.

The PWIP program is a short term public works project to create employment opportunities immediately after the flood. A total of $16.7 million was allocated for Pennsylvania under this program. Most of the money was merged with OEP public building restoration money because the EDA program was for building enhancement which is not covered by OEP.

The Long Term Public Works Program is dedicated to assisting a stricken area in developing such long term economic development programs as industrial parks and shopping centers. Pennsylvania received approximately $10.6 million under this program. This program involves clearing the land and installing the necessary infrastructure (sewer, water, roads, etc.) to encourage industrial and commercial development.

The EDA technical assistance program centers around the Wilkes-Barre area primarily because that was the area of most significant damage and secondarily because it is an Economic Development District (EDD). (The Susquehanna and Capital sub-state regions are not EDD's).

The TA program was divided into short term and long term tasks with a total funding of approximately $5 million. The short term

effort dealt primarily with payment for additional building inspection and college night courses in home repair.

The long term TA effort for the Wyoming Valley was coordinated by the Economic Development Council of Northeastern Pennsylvania (EDCNP) acting as an umbrella organization for three sub-groups:

(a) Flood Recovery Task Force

(b) Pennsylvania Economy League

(c) Wilkes College Institute of Regional Affairs.

The Flood Recovery Task Force (FRTF) received the majority of the TA program money, $261,000 as compared to $246,000 for EDCNP. FRTF earmarked $150,000 for consultant services but to date no consultants have been hired. The primary mission of the FRTF is to perform "grass roots" type community coordination, such as local meetings and hearings.

The Pennsylvania Economy League (PEL) was an established organization which was tasked to bring to bear their extensive experience in isolated problems of individual boroughs and townships. A good example is Jenkins township which had only about 55 houses damaged and needed guidance in how to apply for state and federal funds.

The Wilkes College Institute for Regional Affairs was assigned to prepare a job description for borough and community flood recovery administration; review applications of prospective applicants; design and provide courses in flood recovery administration to minimally qualify the best applicants for this one year administration job; and provide specific flood recovery assistance to these administrators.

In summary, EDA's primary effort was the creation of jobs immediately following the Agnes disaster. EDA has maintained a record of all expenditures; however, additional information may be obtained by contacting the organization responsible for the administration of the funds, e.g., Pennsylvania Economy League (PEL).

CONTACTS: Cliff Rossignol, Director, Wilkes-Barre EDA Offices, (717) 825-8783

Howard Grossman, Director, EDCNP, Wilkes-Barre, (717) 457-7456

Raymond Carmon, Director, Pennsylvania Economy League, (717) 824-3559

Andrew Shaw, Flood Recovery Task Force and Wilkes College Institute for Regional Affairs, (717) 829-1983.

General Services Administration

The General Service Administration (GSA) shipped supplies and trailers to assist in the flood recovery. An automated data base was not developed for this effort.

Any data available about GSA's flood recovery efforts can be obtained from OEP.

CONTACT: Darrell Clokey, (202) 963-3118.

Small Business Administration

The Small Business Administration (SBA) provided low interest disaster loans for both home and business losses. The purpose of the loan is the repair, rehabilitation or replacement of property damaged or destroyed.

The individual home loan could not exceed $55,000; a maximum of $50,000 can be allocated to repair physical damage to a home and a maximum of $10,000 can be allocated to repair or replace household goods and personal property.

Business disaster loans could not exceed $500,000; however, the SBA could approve a guarantee of up to 90% of a commercial bank loan to restore disaster damage in addition to the $500,000 direct loans. Economic injury disaster assistance loans are also combined under the $500,000 ceiling.

To obtain a loan, the applicant filed the proper application forms with the local SBA office. The loan application information is kept

by the local office and is not sent to a central office. As a result, the application records are not computerized. The appropriate forms are described at the end of this section.

The loan approval information has been computerized according to the SBA. Mr. Thomas Arnoldi, the Director of Pennsylvania's Human Relations Commission, has received listings of the approval data.

The approval data includes the following:

(a) Name
(b) Address including Zip Code
(c) Gratuity terms including
    (1) Real collateral
    (2) New or old construction
(d) Loan type (direct or bank)
(e) Amount of loan
    (1) SBA share
    (2) Bank share
(f) Type of loan (home or business).

With only a few exceptions, the data does not contain the Standard Industrial Classification (SIC) Code for business loans.

For a disaster home loan the applicant must file the following forms:

(a) SBA Form 5C (4-72), Application for Disaster Loan - Home
(b) SBA Form 824, Personal Property Damaged or Destroyed by Disaster
(c) If the loan exceeds $5,000 also file
    (1) SBA Form 413, Financial Statement
    (2) Tax return for most recent taxable year
(d) If the loan exceeds $10,000, also file SBA Form 601, Statement of Compliance.

For a business loan the applicant must file the following forms:

(a) SBA Form 5 (1-72), Application for Disaster Loan - Business

(b) If the loan exceeds $10,000, also file SBA form 912, Statement of Personal History.

CONTACT: Richard Lewis, SBA, (202) 382-5745

Department of Transportation

The Department of Transportation's Federal Highway Administration (FHWA) is responsible for managing the emergency relief funds for the Federally aided highway system. As such, they approved Pennsylvania Department of Transportation (PENN DOT) requests via programming documents for funds to repair roads and bridges damaged by the flood. Associated with the programming documents are two Federal forms, PR1 and PR37, which were used as a basis for developing a computerized cost accounting data base for use in managing FHWA emergency relief funds. These forms were used with each of the 127 existing programming documents. Depending on the amount of damage, a programming document can cover the following:

(a) major projects such as bridges
(b) temporary repairs by state, district or county
(c) permanent repairs by state, district or county.

Items (b) and (c) are further classified by system, i.e.,

(a) Interstate
(b) Primary
(c) Secondary
(d) Urban
(e) Topic type II - Local system that ties into intercity system.

CONTACTS: Mr. Burke, FHWA, Harrisburg Office, (717) 782-3434
Fred Verity, FHWA, Washington Office, (202) 426-0450
Al Mathers, DOT, Program Analysis Division, (202) 426-0674.

Department of Agriculture

The U.S. Department of Agriculture (USDA) in cooperation with the Commonwealth of Pennsylvania Department of Agriculture administered several programs pertaining to the agricultural damage in Pennsylvania and the resultant recovery program. In terms of recovery in an agricultural area, there are four basic programs. The first and most significant program is administered by the Farmers Home Administration (FHA) through loans similar to the Small Business Administration disaster loans. Under this particular type of loan program there are two subcategories of loans: the Farmers Emergency Loan, and the Real Housing Disaster Loan. These loans only apply to rural farm houses and farm buildings and not their contents. Original estimates for these two loan programs were $56 million and $15 million respectively.

The Farmers Home Administration information is computerized. The computer is located in St. Louis, Missouri. The data base contains the name of the applicant, the town, the zip code, the loan amount, and the forgiveness amount. Further information should be obtained as to the total extent of this data base.

The second category of disaster assistance is available from the Agriculture Stabilization and Conservation Service. The program which makes disaster funds available for the Emergency Conservation Measures (ECM) Program is the Rural Environmental Assistance Program (REAP).

The third type of agricultural oriented disaster funds are handled by the Soil Conservation Service (SCS) which is the technical arm of the Agriculture Stabilization and Conservation Service. SCS has funds available for extreme restoration and soil erosion prevention. Also available to SCS is 5% of the REAP money made available for technical assistance to farmers who wish to install flood control ponds or for small watershed feasibility studies.

The last major source of agricultural funds is the Federal Crop Insurance Program. Only 10 counties out of the 67 in Pennsylvania actually qualify for crop insurance. Of these, only eight were in the immediate flood area. Not only were just 10 counties involved in the Federal Crop Insurance Program but only a very restricted number of crops were allowed to be insured.

Two other programs are administered by the U.S. Department of Agriculture in a time of disaster. First is the Food and Nutrition Service Food Stamp Program. The second Food and Nutrition Service program is the Commodity Food Program.

There is very little information computerized with the exception of the Farmers Home Administration data in St. Louis. However, data on federal expenditures can be obtained from the sources responsible for administering the various USDA programs.

CONTACTS: Penrose Hollowell, FHA, Harrisburg, (717) 782-4476

William Wood, FHA, St. Louis, (314) 622-4400

Ken Boyer, REAP, Harrisburg, (717) 782-4547

Earl Nikkel, Federal Crop Insurance Corporation, (202) 447-6391

Irving Stribling, Food Stamp Program, New York, (212) 264-1198

Food Distribution Center, Princeton, New Jersey, (609) 452-1610

Robert Holstead, Soil Conservation Service, Harrisburg, (717) 782-2297

William Fluke, Crop Reporting Service, Harrisburg, (717) 787-3904.

Department of Health, Education and Welfare

The Department of Health, Education and Welfare (HEW) was primarily involved in the flood financial support given to restoration of elementary and secondary schools. They have a data base which describes the damage created to these elements of the education system; however, it is not computerized. Similar information was maintained by the Pennsylvania Department of Education and Pennsylvania Department of

Public Welfare whose data holdings are described below.

CONTACTS: Eugene Trivits, Philadelphia Office, (215) 597-9138
Dean Snyder, Disaster Support, (202) 962-2144.

Department of Labor

The Department of Labor spent $5.7 million for the Special Program for Emergency Employment Development (SPEED) Program. In addition to the SPEED program, the Department of Labor provided additional funds for a number of other programs. The Public Employment Program (PEP) received $6.3 million. The Neighborhood Youth Corps (NYC) Program received $190,000 for the school program and $124,800 for the out of school program. Operation Mainstream received $500,000. All funds were administered by the state and were used to assist in debris clean-up.

Since these programs were administered by the state, information can be obtained from the Pennsylvania Department of Labor and Industry which is described in a later section of this paper.

CONTACT: Joseph Murta, Manpower Administration Accounting, (215) 438-5200, extension 7718.

STATE AGENCIES

In the context of the data base described in Section IV, a number of state agencies were identified as potential data sources and interviews with the appropriate personnel were conducted. Three criteria were used to identify those state agencies to contact:

(a) the agency had the responsibility for administering a Federal disaster relief program

(b) the agency spent more than $1 million of state disaster relief funds

(c) the agency collects, on a regular basis, data relevent to the Flood Impact and Recovery Monitoring portion of the data base.

If at least one of these criteria was met, the agency was contacted.

A list of the Pennsylvania state agencies is given in Table F-I. For each agency, the criteria which it meets is identified. If the agency does not meet any of the criterion, then it is classified as "not a potential data source". However, although they are not considered potential data sources, several agencies did collect and maintain some damage data for facilities under their control. OSPD may wish to consider this data in developing the damage portion of the data base. This data was collected to support state requests for Federal disaster relief funds or to inventory damages to resources under their control. Data collected by these agencies is in general more detailed than that available from the appropriate Federal agency. Each organization in the state government should be contacted and a copy of any reports on flood damage obtained.

Based upon the analysis presented in Table F-1, 15 state agencies were identified as potential data sources. A discussion of these agencies, their involvement in the flood recovery effort and the flood damage/recovery data available from the agency is presented in the following sections.

Executive Offices

A review of the Executive Offices revealed two potential data sources within the Office of Budget. The first is the Planning and Program Division which is responsible for the implementation of the Planning Program and Budget (PPB) system and the collection of any associated data. The second source is the Federal Program Coordinator who is responsible for developing and implementing the Federal Aid Control System, Figure F-2.

The Planning and Programming Division is responsible for collecting and maintaining "program measure" data used in evaluating the impact of the various state programs, categories and sub-categories. All program measures used in the annual budget document were reviewed and those measures which are relevant to the Flood Damage/Recovery Data Base

TABLE F-1
STATE AGENCIES AS POTENTIAL DATA SOURCES

AGENCY	ADMINISTERED OR SUPPORTED FEDERAL PROGRAM	SPENT $1M STATE RELIEF FUNDS[1]	COLLECTS DATA ON REGULAR BASIS	NOT A POTENTIAL DATA SOURCE
Office of the Governor				●
*Executive Offices			●	
Office of Lieutenant Governor				●
Department of the Auditor General				●
Treasury Department				2
*Department of Agriculture			●	
*Department of Banking, Securities Commission			●	
*Council of Civil Defense	●			
Civil Service Commission				●
*Department of Commerce		●	●	
*Department of Community Affairs		●	●	
*Department of Education			●	
*Department of Environmental Resources		●	●	
Fish Commission				●
Department of Health				●
Historical and Museum Commission				●
Department of Insurance				●
*Department of Justice			●	
*Department of Labor and Industry	●		●	
*Department of Military Affairs		●		
Milk Marketing Board				●
Board of Probation and Parole				●
Department of Property and Supplies				●
Public Utility Commission				●
*Department of Public Welfare	●	●	●	
*Department of Revenue			●	
Department of State				●
State Police				●
Tax Equalization Board				●
*Department of Transportation				3
Legislative				●
Judiciary				●
*Pennsylvania Higher Education Assistance Agency		●		

*Discussion of Agency Included in this Report

(1) As of January 26, 1973, News Release, Office of the Governor.

(2) The treasury is responsible for the disbursement of state funds. As a result, they maintain a record of all expenditures which may serve as a secondary data source for state expenditures for the flood recovery programs.

(3) Although the Department of Transportation did not meet any of the criteria, they did collect and maintain damage data to the transportation system. As a result, a discussion of the Department of Transportation's data base is provided.

FEDERAL AID CONTROL SYSTEM

REPORT DATE SEPTEMBER - OCTOBER, 1971

THE FORMAT OF THIS REPORT IS AS FOLLOWS. THE REQUESTS FOR AND AWARDS OF FEDERAL ASSISTANCE FOR EACH MAJOR STATE AGENCY DURING THE REPORTING PERIOD ARE LISTED FIRST. ALL OTHER GRANTEES ARE LISTED BY COUNTY. REQUESTS FROM GRANTEES WITHIN A COUNTY ARE LISTED PRIOR TO AWARDS WITHIN THE COUNTY.

1. THE WORDS 'DEPARTMENT OF' ARE GENERALLY NOT USED FOR STATE AGENCY APPLICANT/GRANTEES NOR FOR FEDERAL GRANTORS.

2. THE 'FPN' IS THE FEDERAL PROGRAM NUMBER FROM THE CATALOG OF FEDERAL DOMESTIC ASSISTANCE UNDER WHICH ASSISTANCE IS REQUESTED/PROVIDED.

3. THE 'SCH NUM' IS THE UNIQUE IDENTIFICATION NUMBER ASSIGNED BY THE STATE CLEARINGHOUSE. THE FIRST FOUR DIGITS INDICATE THE CALENDAR YEAR AND MONTH THE DATA WAS FIRST RECEIVED BY THE CLEARINGHOUSE.

4. THE LETTER 'G' OR 'L' TO THE RIGHT OF THE PROGRAM/PROJECT TITLE INDICATES WHETHER FEDERAL FUNDS ARE REQUESTED/AWARDED ON A GRANT OR A LOAN BASIS. THIS LETTER IS FOLLOWED BY THE FEDERAL, STATE, LOCAL AND OTHER FUNDS, AS APPROPRIATE AND WHEN PROVIDED, INVOLVED IN THE SPECIFIC GRANT ACTION.

5. THE 'DURATION' OF THE GRANT, WHEN KNOWN, IS GIVEN BY YEAR-MONTH-DAY.

SAMPLE FORMAT

STATE DEPARTMENTS
APPLICANT AGENCY NAME

REQUESTS

PROGRAM/PROJECT TITLE	GRANTOR G $FEDERAL	$STATE	$LOCAL	$OTHER	FPN / DURATION	SCH NUM

AWARDS

GRANTEE / PROGRAM/PROJECT TITLE	GRANTOR L $FEDERAL	$STATE	$LOCAL	$OTHER	FPN / DURATION	SCH NUM

OTHERS BY COUNTY

ADAMS COUNTY
REQUESTS

PROGRAM/PROJECT TITLE	GRANTOR L $FEDERAL	$STATE	$LOCAL	$OTHER	FPN / DURATION	SCH NUM

AWARDS

GRANTEE / PROGRAM/PROJECT TITLE	GRANTOR G $FEDERAL	$STATE	$LOCAL	$OTHER	FPN / DURATION	SCH NUM

FIGURE F-2
FEDERAL AID CONTROL SYSTEM – REPORT FORMAT

identified. Twenty-five different measures were identified. Each program measure was discussed with the Planning and Programming Division personnel. During the discussions, the source of the data was identified, and an estimate made of the data's validity. A list of the forty-five program measures, the source of the data and its validity are given in Tables F-2 through F-4.

The program measure data maintained by the Planning and Programming Division is annual data. As mentioned earlier, it is desirable to develop quarter data for the Flood Damage/Recovery Data Base. The feasibility of this can easily be determined by contacting the person responsible for developing the data.

In addition to maintaining an annual data base of program measures, the Office of Budget is developing and will maintain, under the responsibility of the Federal Program Coordinator, a Federal Aid Control System. This system is planned for operation on March 1, 1973. The Federal Aid Control System is a computerized system which contains all information on PSCH Form A and PSCH Form B (Application for Federal Aid) of the project notification and service system. These forms cover 101 federal programs. The system also contains all information available on Federal Form 3F240 (Notification of Grant-in-Aid Action) which is submitted for 222 Federal programs or 95% of the Federal funds allocated to the State of Pennsylvania.

Although documentation specifying the details of the operation of the Federal Aid Control System was not available, it appears that the system will have the capability to sort and provide information on the status of flood recovery requests for Federal funds through a key-word search. The system as presently designed will provide standard reports of the form shown in Figure 9. Although the capability does not presently exist to provide summaries aggregated according to rules specified by OSPD, the capability most likely can be developed.

TABLE F-2

SELECTED PROGRAM MEASURES

HEALTH - PHYSICAL AND MENTAL WELL-BEING

PROGRAM MEASURE	SOURCE		
	AGENCY	CONTACT	VALIDITY
Short-term hospital beds available	Department of Public Welfare	George Kutcha	Good Last Year
Long-term and nursing care beds available	Department of Public Welfare	George Kutcha	Good Last Year
Persons potentially eligible for medical assistance	Department of Public Welfare	Charles Cubbler	Calculate Guess
Persons certified eligible for medical assistance	Department of Public Welfare	Ken Fry	Good
Persons receiving medical assistance	Department of Public Welfare	Don Downs	Rough Approximat
Persons aged 65 or over in State mental institutions	Department of Public Welfare	Bob Haigh	Guess
Average daily census of State general hospitals	Department of Public Welfare	Bill Lawson	Good
Persons provided life support services	Department of Public Welfare	Bob Haigh	Poor
Miles of polluted surface waters	Department of Environmental Resources	Joe Skovron	Good
Square miles of polluted ground waters	Department of Environmental Resources	Joe Skovron	Good
Unsatisfactory solid waste disposal sites	Department of Environmental Resources	Joe Skovron	Good

TABLE F-3

SELECTED PROGRAM MEASURES

INTELLECTUAL DEVELOPMENT AND EDUCATION AND SOCIAL DEVELOPMENT

PROGRAM MEASURES	SOURCE		
	AGENCY	CONTACT	VALIDITY
Eligible disadvantaged children for pre-school education	Department of Education	Don Carroll	Title I ESEA % Est.
Enrollments for pre-school education	Department of Education	Randy Bower	Good
Pupils eligible for elementary and secondary education program services	Department of Education	Don Carroll	Title I ESEA % Est.
Pupils enrolled in elementary and secondary education programs	Department of Education	Don Carroll	Good
Children under 18	Program Policy Guidelines	Henry Brillinger	Good
Children receiving child welfare services	Department of Public Welfare	Gordon Johnson	Good
Families in need of homemaker services	Department of Public Welfare	Bill Conwood	Poor
Families receiving homemaker services	Department of Public Welfare	Bill Conwood	Poor

TABLE F-4

SELECTED PROGRAM MEASURES

ECONOMIC DEVELOPMENT AND INCOME MAINTENANCE

PROGRAM MEASURES	SOURCE: AGENCY	SOURCE: CONTACT	VALIDITY
Tourism and Travel Development - Advertisement responses serviced	Department of Commerce	Charles Welsh	Good
New or expanded industrial projects	Department of Commerce	Charles Welsh	Good
PIDA financed plant locations and expansions	Department of Commerce	Charles Welsh	Good
Community facility projects funded	Department of Commerce	Charles Welsh	Good
Site development projects funded	Department of Commerce	Charles Welsh	Fair
Net new employment opportunities	Department of Commerce	Charles Welsh	Fair
PIDA financed employment opportunities	Department of Commerce	Charles Welsh	Good
Farm population	Department of Agriculture	Dave Brown	Good
Farms	Department of Agriculture	Dave Brown	Good
Average farm family income	Department of Agriculture	Dave Brown	Good
Persons receiving cash grants	Department of Public Welfare	Ken Fry	Good
Persons below poverty level not receiving cash grants	Department of Public Welfare	Ken Fry & Charles Passomore	Guess
Persons leaving assistance rolls and becoming self-sufficient	Department of Public Welfare	Ken Fry & Charles Passomore	Good
Individuals receiving unemployment compensation	Department of Labor & Industry	Rocco Palidino	Good
Trainees enrolled in instructional courses	Department of Labor & Industry	Rocco Palidino	Fair†
	Department of Community Affairs	Ed Scofield	Fair†
	Department of Education	Wayne Podvia	Fair†
Trainees completing instruction during the year	Department of Labor & Industry	Rocco Palidino	Fair†
	Department of Community Affairs	Ed Scofield	Fair†
	Department of Education	Wayne Podvia	Fair†
Percent of unemployed placed in jobs as a result of this program	Department of Labor & Industry	Rocco Palidino	Calculated From Above
	Department of Public Welfare	Ken Fry	Calculated From Above
	Department of Community Affairs	Ed Scofield	Calculated From Above
	Department of Education	Wayne Podvia	Calculated From Above
Substandard dwelling units	Department of Community Affairs	Ed Scofield	Unknown
Families occupying substandard dwellings	Department of Community Affairs	Ed Scofield	Unknown
Construction of new dwelling units through state efforts	Department of Communtiy Affairs	Ed Scofield	Fair
Dwelling units rehabilitated through state efforts	Department of Community Affairs	Ed Scofield	Poor
Dwelling units raised to compliance with code standards	Department of Community Affairs	Ed Scofield	Poor
Federal redevelopment projects receiving state assistance	Department of Community Affairs	Ed Scofield	Good
State assisted local redevelopment projects	Department of Community Affairs	Ed Scofield	Good
Property damage caused by soil erosion (in thousands)	Department of Environmental Resources	Walt Peechatka	Unknown Following Flood

†Combined Figure of all Manpower Programs

CONTACTS: Henry Brillinger, Chief, Planning and Program Division, (717) 787-7340

Charles Griffiths, Federal Program Coordinator, (717) 787-7852.

Department of Agriculture

The Pennsylvania Department of Agriculture in cooperation with the U.S. Department of Agriculture, collects, on a regular basis, data on agricultural production within the State of Pennsylvania. This information and its relationship to the Flood Damage/Recovery Data Base was described earlier in the section on the Federal Department of Agriculture. Data on funds administered by Pennsylvania for the AGRISPEED Program are included in the section on the SPEED Program under the Pennsylvania Department of Labor and Industry.

Department of Banking

The Department of Banking is responsible for only state chartered banks. As part of their responsibilities, they require each state chartered bank to provide quarterly statements of their financial condition. Included in these reports is the amount of demand and time deposits.

Similar information is available on other financial institutions within Pennsylvania. The Statistics Division, Department of Research, at the Federal Reserve Banks of Cleveland, Ohio and Philadelphia, Pennsylvania collects data on National Banks. The Pennsylvania Savings and Loan League and the Pennsylvania Credit Union League collect data on Savings and Loans and Credit Unions, respectively.

Most of the information discussed is presented in the Pennsylvania Abstract; however, it is only provided on an annual basis and is not released until March of the following year[172].

[172] 1972 Pennsylvania Abstract, pp. 49-55.

CONTACTS: William Beatty, Department of Banking (717) 787-2191

George K. Keet, Pennsylvania Savings and Loan League, (717) 238-9458.

Council of Civil Defense

The State Council of Civil Defense acted as the state clearinghouse for the Office of Emergency Preparedness (OEP) Damage Survey Reports (DSR's) and Project Applications (PA's). All DSR's and PA's were sent to the Council of Civil Defense. The Council in turn obtained state approval for each PA and forwarded it to OEP. In performing this function, the Council has maintained a file of all DSR's and PA's. There are approximately 18,000 DSR's and 2,400 PA's. No attempt has been made to automate the files; however, OEP has automated the PA's.

CONTACT: Craig Williamson, Operations Officer, (717) 787-5300.

Department of Commerce

The Department of Commerce is responsible for the administration of the Emergency Short-Term Commercial Loan Program funded from Pennsylvania's Flood Relief Recovery funds. As part of this program, the Department of Commerce conducted a survey called HELP. The purpose of the survey was to identify those firms needing short-term financial assistance. The loans were used primarily to provide funds to those businesses which had applied for, but not received, SBA loans. Approximately 90 loans were made under this program (65-70 loans are still outstanding). The loans were for 90 days with one renewal permitted. A total of $28.9 million was loaned, of which $19.9 million is still outstanding.

Since the state cannot loan state funds directly to private firms, loan applications approved by the state were transferred, along with the funds, to the Local Industrial Development Authority. The Authority

in turn executed a loan to the firm involved. The damage information to be gained from the loan program is rather limited since it was operated only as an interview measure.

The Department of Commerce conducts, on a regular basis, a census of the following classes of firms:

(a) manufacturing industries
(b) railroad repairs establishments
(c) water utilities
(d) sewer utilities
(e) telephone utilities
(f) gas utilities
(g) electric utilities.

The census is a potentially valuable source of information for any special analyses; however, its usefulness, in terms of the Flood Damage/Recovery Data Base is limited because the census is only collected annually, and results of the census are not published until more than a year after the data is received.

For example, the 1972 census of manufacturing industries is conducted in January, 1973. These reports must be filed with the Department of Commerce by January 31, 1973. The data contained in these reports is compiled by the Department of Commerce and a report containing the result of the census is published in March, 1974.

CONTACTS: Al Smigel, Chief, Bureau of Statistics, (717)787-4088.
Charles J. Blankenship, Disaster Recovery Coordinator, (717) 787-6974.

Department of Community Affairs

The Department of Community Affairs (DCA) was reviewed as a data source because:

(a) they collect data on a regular basis

(b) they were responsible for the expenditure of more than one million dollars of state disaster relief funds.

The data that is collected on a regular basis by DCA is described in the section on the Executive Office. This data is associated with indicators that reflect the status of housing within the state and the impact that state efforts are having on eliminating those units classified as substandard.

DCA does have data associated with the expenditure of approximately $12 million of state disaster relief funds (as of January 1973). Information with respect to contracts is available from the comptroller. Additional information, by project, is available from the bureau responsible for the administration of the program. The major program within DCA is the Housing and Redevelopment Program administered by the Bureau of Community Programs.

DCA has very little damage data. In fact, only one category of damage data was identified and that was associated with a DCA program for grants to volunteer fire companies and ambulance services. All grants are supported by applications specifying the damage incurred by the fire companies or ambulance services.

DCA also maintains a record of the status of flood insurance programs, i.e., political subdivisions which have enacted resolutions and taken the necessary steps to qualify for the Federal flood insurance program.

Another potential data source within DCA is the "Real Estate Tax Reimbursement Program". To qualify for reimbursement, each property owner must file an application with the local government by April 2,

1971.[173] The form contains very little information; however, the applications could be used to quantify the number and location of damaged properties. If OSPD had been involved in the design of the application, some data relevant to the planning effort could have been included in the form. Such opportunities will arise periodically. As a result, it is important that OSPD remain aware of any new bills and the possibility of collecting data as part of the actual implementation and administration of the bill.

CONTACTS: Karl Smith, Director, Bureau of Community Programs, (717) 787-2156

Dallas Dollase, Director, Bureau of Community Planning, (717) 787-7400

Roderic Terry, Director, Bureau of Local Government Services, (717) 787-7148

Glen Wightman, Comptroller, (717) 787-6440.

Department of Education

The Department of Education was responsible for preparing and submitting Project Applications (PA's) to the Office of Emergency Preparedness (OEP) for non-public educational facilities within the state. In addition, they have maintained a record of all damage to the educational system in the state. Although the data has not been automated, it may provide the basis for developing a data base with greater detail than that available from the OEP PA data file.

The Department of Education also collects, on a regular basis, program measure data used in evaluating and developing the annual budget. This data is described in the section on Executive Offices.

[173] This requirement may be eliminated. A bill to eliminate the requirement is now before the Legislature.

CONTACTS: Dr. Neal Musmanno, (717) 787-7575
Don Carroll, (717) 787-6455
Raymond Bowers, Comptroller, (717) 787-5206.

Department of Environmental Resources

The Department of Environmental Resources (DER) was identified as a potential data source because it spent over $1 million dollars of state disaster relief funds. It also collects data relevant to the flood impact/recovery monitoring section of the data base. This data is described in the section on the Executive Office. In addition, DER has developed estimates of costs for required mine work to alleviate conditions caused by the flood.

DER was involved in the immediate flood recovery effort as the state representative in preparing 3,800 Damage Survey Reports (DSR's). These were primarily for stream clean-up and restoration. In addition, they prepared and submitted a Project Application to OEP for damage to property under DER control.

About 85% of the $1.17 million state disaster relief money allocated to DER was spent as of January 26, 1973 for general governmental operations, i.e., additional wages and salaries directly attributed to flood and stream improvements deemed necessary, but not covered by federal programs.

Details on DER expenditures, including a new category just approved, i.e., Mine Pool Elevation and Subsidence, can be obtained from the DER comptroller. This is the only automated flood related data available from DER.

CONTACTS: Gilbert Kyle, Engineering and Construction, (717) 787-6750
Chiesa Bruno, Comptroller, (717) 787-3104.

Pennsylvania Department of Justice

The Federal Bureau of Investigation (FBI) has established a Uniform Crime Reporting System (UCRS) and is in the process of establishing state clearinghouses to process the information gathered. The Bureau of Criminal Justice statistics in the Pennsylvania Department of Justice has been designated as the state clearinghouse for Pennsylvania, but at present, it has not been certified by the FBI. The problem with obtaining certification is due in part to problems created by the Agnes flooding of the Commonwealth Management Information Center (CMIC) in Middletown.

Because they have not been certified, all reports by the local police departments are sent to both the Bureau of Criminal Justice Statistics and the FBI. Even though the Bureau of Criminal Justice Statistics is not certified, certified data can be obtained through them from the FBI. As a result, requests for data from this system should be made to the Bureau of Criminal Justice Statistics with the stipulation that it be obtained from a certified data base.

A detailed description of the reporting system is given in Pennsylvania Uniform Crime Reporting Manual, Department of Justice, 1971. In summary, the system consists of seven monthly reports (Forms JCJS-100 to JCJS-106) and one annual report (Form JCJS-107). These reports are submitted by each of the 756 police departments and are stored in the FBI computerized data base. The contents of each of the forms has been reviewed and several items were identified for inclusion in the Flood Damage/Recovery Data Base. These items are all contained on Form JCJS-100. The other forms contain additional information and can be used if a problem is identified and a more detailed analysis is required.

The data suggested for the Flood Damage/Recovery Data Base consists of three items for each of nine classes of Category One offenses. The three items are as follows:

(a) offenses reported

(b) total cleared by arrest

(c) persons under 18 arrested.

The nine classes of Category One offenses are as follows:

(a) murder and nonnegligent manslaughter

(b) negligent manslaughter

(c) forcible rape

(d) robbery

(e) aggrevated assault

(f) burglary

(g) larceny - theft: $50 and over

(h) larceny - theft: under $50

(i) auto theft.

The data should be requested by quarter and by county. Since the FBI data base is computerized, it may be possible to get the data in a form compatible to a computerized data base if one is selected by OSPD.

The Bureau of Criminal Justice Statistics also receives reports on Category Two offenses; however, the reliability of this data in computerized format is still low.

CONTACTS: John Mease, Deputy Director, Bureau of Criminal Justice Statistics, (717) 787-5153

Mr. Spalone, Bureau of Criminal Justice Statistics, (717) 787-5152

Robert Conger, FBI - UCR Center, (202) 324-2614.

Department of Labor and Industry

The Department of Labor and Industry is potentially one of the most valuable data sources for the development of the Flood Damage/ Recovery Data Base. They maintain a computerized data base in support of their responsibility to administer Pennsylvania's Unemployment Compensation Insurance (UCI) Program.

In addition, the Department of Labor and Industry (L&I) was responsible for administering two federal disaster relief programs: Disaster Unemployment Assistance (DUA) and Special Program for Emergency Employment Development (SPEED). In this capacity, L&I maintained the computerized data bases necessary to account for their expenditures.

Because of the wealth of data available from L&I, a brief description of the three data bases is presented with special emphasis on that data relevant to Flood Damage/Recovery Data Base.

Unemployment Compensation Insurance

The UCI data base consists of the following eight data files:

(a) employer address file
(b) out of balance ledger file
(c) employer master file
(d) master wage file
(e) master claim file
(f) master claim key file
(g) claimant history file system (consists of six interrelated files
(h) trade readjustment allowances file.

Of the eight files maintained by L&I, the fourth file, master wage file, could provide data for the Flood Damage/Recovery Data Base. The file is comprised of information contained on the employer's (quarterly) report for unemployment compensation, Forms UC-2 and UC-2A. Although the information is supplied by employer (there are now presently between 170,000 and 180,000 active employers in Pennsylvania) the information is recorded by employee (there are over four million employees covered by UCI).

The master wage file contains the following information:

(a) employee's social security number

(b) name

(c) employer's account number

(d) employer's plant number

(e) employee's wages.

For each employee Items (c), (d), and (e) are repeated for each quarter and each employer with a limit of five quarters and 35 mployers/ quarter. If the information in this file is used in conjunction with information on the employer address file and the employer master file, the employer's account number and plant number can be related to Standard Industrial Classification (SIC) Code, address and federal identification number. This conversion capability will permit the development of employment statistics by county and by SIC Code. A further classification by occupation may be possible. The Bureau of Employment Security publishes a document called Pennsylvania's Insured Unemployed which contains this occupation classification for all insured unemployed. However, the data is not part of the L&I computerized data base; it is collected manually from the field offices.

Based upon the findings presented in the preceding paragraph and the amount of data available from L&I, it appears that a detailed evaluation of the complete L&I data base should be conducted.

To permit L&I to maintain current records of all employees, any employer who discontinues business or remains in business but without employees is required to file a Employer's Report of Discontinued Employment, Form UC-2B. A review of these forms would provide a basis for identifying those businesses in the Unemployment Compensation Insurance System which discontinued business after the flood.

Disaster Unemployment Assistance

The Department of Labor and Industry was assigned the responsibility to administer the Disaster Unemployment Assistance (DUA) Program funded by the U.S. Department of Labor. To support the administration

of DUA, a file was established which contains most of the information contained on the following forms:

(a) Application for Disaster Unemployment Assistance (Form DUA-1)
(b) Affidavit of Earnings (Form DUA-2)
(c) Weekly Request for Disaster Unemployment Assistance (Form DUA-3).

Information contained on the computerized file which is relevant is as follows:

(a) social security number
(b) name
(c) address
(d) occupation code
(e) industry code
(f) payment by date.

In using this data, it should be remembered that DUA applied only to those individuals unemployed by the flood and not covered by UCI. However, this information would, at least partially, fill the gap between the total labor force and the labor force covered by UCI. (Approximately 90% of the labor force is covered by UCI.)

Special Program for Emergency Employment Development

In addition to DUA, L&I also administered the federally funded Special Program for Emergency Employment Development (SPEED) Program. Basically, the purpose of the SPEED program was to provide short-term work experience for unemployed persons in activities which provide relief from the flood disaster caused by Tropical Storm Agnes. The program provided jobs for 17,800 individuals and cost approximately $5.7 million.

Data on the project expenditures is obtained from two forms used in administering the program:

(a) Referral Notice or Application (Form ES-950B)

(b) Stripend Request and Authorization (Form ES-952).

The information on these form has been punched on cards and could be made available for any processing which may be desired. Care should be exercised in using this data to calculate total damage since some of the SPEED employees were allocated to agencies and projects covered by Project Applications. Adding both together may result in some double counting. A small portion of the SPEED funds were allotted to the Pennsylvania Department of Agriculture for a program called AGRISPEED. These funds are included, however, in the L&I SPEED data base. L&I administrative costs of $560,000 were incurred in addition to the SPEED stripends.

CONTACTS: Ed Ryan, Bureau of Employment Security, Data Processing, (717) 787-7527

Mike McCarty, Bureau of Employment Security, Data Processing, (717) 787-2609

John Senise, Bureau of Employment Security (SPEED), (717) 787-5916

Marvin Herrold, Bureau of Employment Security, Research and Statistics, (717) 787-3265.

Department of Military Affairs

The Department of Military Affairs provided numerous services during and after the flood. These services included traffic control, medical aid, debris removal, rescue work, and sleeping accomodations. Approximately $1.3 million of state disaster relief funds were spent in these efforts. In addition, the federal government released military training personnel to the flood recovery effort. The cost to the federal government for this was over $2 million.

Since resources were made available from all over the Commonwealth of Pennsylvania, expenditures cannot be broken down by locality or county within the flood disaster area. A final report on expenditures has not yet been published, although one is planned.

CONTACT: Col. Richard Weaver, Administrative Officer, (717) 787-7249.

Department of Public Welfare

The Department of Public Welfare, from the standpoint of data collection, was deeply involved in the flood recovery effort. They administered the Disaster Relief Food Stamp program for the U.S. Department of Agriculture and they spent more than $1 million in state Flood Relief Recovery funds. In addition, they collect on a regular basis data relevant to the Flood Damage/Recovery Data Base and maintained a data base on flood damage to health facilities.

Disaster Relief Food Stamp Program

The Disaster Relief Food Stamp Program was handled by the County Boards of Assistance. They were required to file weekly reports (Form NFNS-292) to both the state and federal agencies involved. The reports contained the following information:

(a) number of households

(b) number of persons

(c) value of coupons

(d) number of persons certified for the ongoing food stamp program who received free food stamps because of the disaster.

These reports are presently being compiled and analyzed by the Bureau of Inter-Program Planning and Evaluation. A tabulation of reports from June 22 to July 23 is complete. The total expenditures during that period was $4.1 million.

State Flood Relief Recovery Funds

As of January 26, 1973, the Department of Public Welfare had spent or committed more than $1.5 million of state flood relief funds. More than 90% of these funds were spent on the following three programs:

(a) Public Assistance

(b) Aging Programs

(c) Day Care.

Details of the expenditures related to these three programs can be obtained from the Bureau of Finance and the Bureau of Fiscal Management. A report is available from the Department which identifies Public Assistance expenditures (PA122 funds) which were flood related.

Data Collected on a Regular Basis

In addition to data collected by the Department of Public Welfare for use as program measures in the annual budget document, the Department maintains a data base to support their administration of Public Assistance Funds (PA122). The program measures data is described earlier in the section on the Executive Office.

The data maintained for the administration of PA122 funds consists fo two files -- one for assistance disbursements and one for food stamps. They basically contain the same information for each case:

(a) case number

(b) address

(c) type of assistance

(d) number of persons covered

(e) amount of grant.

Since the data can be aggregated by county, it may be useful for monitoring the flood recovery effort. However, at present, flood related public assistance case loads appear to be quite low; case loads have dropped significantly since the flood. This may be only a short-term effect. As a result, monitoring these programs may be desirable.

Flood Damage to Health Facilities

The Department of Public Welfare collected data on damage to state owned health facilities under their control. These facilities included the following:

(a) mental institutions

(b) hospitals and schools for the retarded

(c) general hospitals

(d) TB hospitals

(e) crippled children care centers

(f) youth development centers

(g) youth forestry camps

(h) geriatric institutions.

This data can be used to provide additional detail to the data obtained from the OEP Project Application data base.

CONTACTS: John Jones, Deputy Secretary, (717) 787-7864

Tim Sawyer, Facilities Damage, (717) 787-5034

Stanley Kline, Bureau of Finance, (717) 787-4384

Charles Erb, Fiscal Management, (717) 787-1389

Herbert Gedmark, Bureau of Inter-Program, Planning and Evaluation, (717) 787-6300

Joseph Rizzo, Data Processing, (717) 787-5633.

Department of Revenue

As part of their revenue collection function, the Pennsylvania Department of Revenue receives timely information about economic activity within the state. The data available within this collection system was reviewed and evaluated in the context of its usefulness in the Flood Damage/Recovery Data Base.

A list of the sources of revenue for which the Department of Revenue is responsible is presented in Table F-5. The data associated with each source was reviewed and the following were identified as having a potential use in the Flood Damage/Recovery Data Base:

(a) corporate net income tax

(b) education sales and use tax

(c) personal income tax.

TABLE F-5

SOURCES OF PENNSYLVANIA INCOME

CORPORATION TAXES

- Corporation Net Income
- Capital Stock and Franchise
- Gross Receipts
- Selective Business
  - Utility Property
  - Insurance Premiums
  - Financial Institutions
  - Other

CONSUMPTION TAXES

- Education Sales and Use
- Cigarette
- Malt Beverage
- Liquor

OTHER TAXES

- Personal Income Tax
- Realty Transfer
- Inheritance
- Minor and Repealed

NON-TAX REVENUE

- Liquor Store Profits
- Institutional Reimbursements
- Licenses, Fees and Miscellaneous
- Fines, Penalties and Interest

SOURCE: The Pennsylvania Manual, Volume 100, 1970-1971, p. 768.

The other taxes have either very little relationship to the flood and its impact on the Pennsylvania economy or would not provide information which permits a geographic breakout. The gross receipts tax applies only to the gross receipts of certain companies. The selective business taxes imposed on utility, property and financial institutions are taxes imposed on real property; however, the tax is based upon initial cost. As a result, flood damage would not be reported in these tax reports. The insurance premiums tax is in effect a tax on the gross receipts of insurance companies.

The remaining taxes or sources of revenue are either centrally collected (cigarette, malt beverage, and liquor) or not related to the flood (Realty Transfer, Inheritance, Liquor Store Profits, etc.).

Interviews were held with representatives of the three Bureaus responsible for collecting the taxes mentioned above. A discussion of the data available for the flood data bases is presented below.

Corporate Net Income Tax

There are approximately 180,000 incorporated businesses in the State of Pennsylvania. Each corporation is required to file an annual return (Form RCT-101 (10-72)) with the Bureau of Corporate Taxes within 3 1/2 months after the end of their fiscal year.

Since corporation casualty losses are deductable from income, information provided by the corporation provides a basis for developing an accurate, reliable estimate of direct damage caused by the flood. This information is provided on Federal Internal Revenue Service Form 1120, a copy of which is provided to the state.

The processing of the corporate tax forms is primarily manual. As a result, any effort to collect direct damage data on corporations from the Bureau of Corporate Taxes would have to be manual and would require a significant effort. However, the Bureau of Corporate Taxes has taken several actions which may facilitate the collection of damage

data included in the Corporate Income Tax Reports. Immediately after the flood, a letter was sent to all corporations indicating that if they noted (on the front page of their return) that they were reporting a flood related casualty loss, that the Bureau would accelerate the processing of their tax reports. The Bureau has been keeping a record of all losses reported. All 1972 Corporate Tax Returns will be received by October 15, 1973, and could feasibly be processed by January, 1974. However, it is imperative that guidelines for collecting the data be specified and provided to the Bureau of Corporate Taxes as soon as possible to facilitate the collection of the data at minimum cost.[174] Any delays will be reflected in the total cost to develop this element of the data base.

A suggested outline form for collecting the data is presented in Figure F-3. The form contains the following information:

(a) firm name
(b) location (zip code)
(c) type of business (SIC Code or Business Code)[175]
(d) type of loss (plant, equipment, inventory, total).

At present it is impossible to determine if the data in this form can be used -- some aggregation may be necessary. However, this aggregation can be easily accomplished if necessary.

Dun and Bradstreet is also a source of the "corporate direct damage" data. Before an effort is initiated to collect the damage

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[174] As of December 31, 1972, only 100 firms had filed corporate net income tax forms with flood related casualty losses. A large number are expected in the next few months.

[175] This information is not on the corporate tax forms, but can easily be added by the Bureau as the data is collected. The business code is provided on Federal Form 1120.

Name and Zip Code	SIC Code	DIRECT DAMAGE			
		Plant	Equipment	Inventory	Total

FIGURE F-3

FORMAT FOR COLLECTION OF CORPORATE "DIRECT DAMAGE" DATA

data from the Corporate Net Income tax forms, an analysis of data from both sources should be conducted to determine the accuracy of the Dun and Bradstreet estimate and whether a source of data other than Dun and Bradstreet is necessary.

The Bureau of Corporate Taxes receives and transfers to a computer data base the annual tax paid by each corporation. Because the data is computerized, it can be accessed and processed easily and at little cost. Although, it does not directly reflect the corporation's sales, it is a surrogate for sales and can provide a meaningful input to the Flood Damage/Recovery Data Base.

A request for copies of the Department of Revenue's data files was made, however, only descriptions of the income tax and sales tax data files have been received. A copy of the corporate data file should be obtained and reviewed in context of the discussion presented in this section to determine if it could be of any use.

Education Sales and Use Tax

The Pennsylvania Education Sales and Use Tax is administered and enforced by the Bureau of Taxes for Education. At present there are 220,000 to 225,000 businesses which have sales tax licenses. These businesses are required to file tax returns monthly, quarterly or annually depending on the amount of tax collected. Upon receipt by the Bureau, the information is entered into a computerized data base for processing and review. The Bureau is in the final stages of implementing an on-line data management system to facilitate this processing and review function.

The data contained in the data base consists of two types of data:

(a) license application data, (Form RTE-350 (2-72))

(b) tax return data (Form RTE-4).

The first set of data contains information about the business, i.e., its location, the form of business, the type of business, federal

employer identification number, etc. The second set of data contains information provided on the tax return. This includes total gross sales, taxable sales, and tax collected. The tax return data in the data base is available from the beginning of 1969. As a result, it provides a means for collecting and compiling historical data as well as current data.

Because the data base is computerized and an on-line data management system will be operational in the near future, the use of this data base to support the Flood Damage/Recovery Data Base will be easy, inexpensive, and timely.

A description of a possible report which could be obtained from the sales tax data base and which would provide meaningful input to the Flood Damage/Recovery Data Base is given in Table F-6. Reports covering the data described in Table F-6 could be obtained from the Bureau with little effort on their part.

Some small businesses are only required to file their sales tax returns annually; therefore, a complete data base relevant to all flood affected business may not be available until sometime in the Fall of 1973. After the first complete report is obtained, semi-annual updates to the report could be made to facilitate the recovery, monitoring and planning functions of OSPD and the regions.

Personal Income Tax

The personal income tax is administered by the Bureau of Personal Income Tax. Reports are received in two forms:

(a) individual and fiduciary income tax forms (Form RIT PA-40 (12-71) and Form RIT PA-42 (12-71))

(b) business witholding tax reports.

There are nearly 4.5 million income tax forms filed annually in Pennsylvania. These forms are reviewed and processed manually. A portion of the data received from these forms is entered into a computerized

TABLE F-6

FLOOD DAMAGE AND RECOVERY REPORT FROM

BUREAU OF TAXES FOR EDUCATION

FOR EACH SIC CODE

By Location (Zip Code):

1. Number Reporting Sales Before Flood
2. Number Reporting Sales After Flood (By Quarter)
3. New Applications (By Quarter: 1971-Present)
4. Number of Corporations Before Flood
5. Number of Corporations After Flood (By Quarter)
6. Gross Sales (By Quarter: 1971-Present)

NOTE: For those businesses submitting monthly returns, a month by month reporting for the three months before and after flood might be desirable.

data base. Basically, the data base consists of the following:

(a) social security number

(b) compensation

(c) net profit/business or farm income

(d) dividend and interest income

(e) miscellaneous income

(f) address.

In addition to providing income information, this data base can also be used as an indicator of the level of investment funds by analyzing Item (d). An alternative which may prove satisfactory would be to obtain the data on individual income and unincorporated businesses from a tape of Federal Income Tax Forms supplied to Pennsylvania by the Federal Government. This data is described in IRS Publication 664 (Rev. 7-72).

Witholding tax reports provide very little information, but there are two major advantages which may warrant their use in the Flood Damage/Recovery Data Base -- the data is computerized and current. Depending on the amount of witholding taxes for the business, witholding tax reports are filed bi-monthly, monthly or quarterly. The only information in the report is the amount of tax witheld during the period. This data would provide an indication of the level of economic activity; however, categorization of the data by type of business may be difficult. It appears that to enable this categorization would require a capability to relate the federal identification number (which is on the report) with a SIC Code. One possibility would be to develop a cross-index from the sales tax data base which contains both items of information.

CONTACTS: Peter Capataides, Director, Bureau of Corporate Taxes, (717) 787-6280

Ron Grutza, Bureau of Corporate Taxes, (717) 787-6560

CONTACTS: James Rutter, Chief, Accounting Division, Bureau of Education Taxes, (717) 787-2468

James Spitler, Accounting Division, Bureau of Education Taxes, (717) 787-6655

Dave Davies, Director, Personal Income Tax Bureau, (717) 787-8333

Ed Mosko, Assistant Director, Personal Income Tax Bureau, (717) 787-8316

John Zilka, Director, EDP Bureau, Department of Revenue, (717) 787-2300.

Department of Transportation

The Pennsylvania Department of Transportation (Penn DOT) had the responsibility for collecting damage estimates and obtaining approval for two types of federal aid to the Pennsylvania highway system; Federal Highway Administration (FHWA) Emergency Relief funds for the federal aided highway system and OEP PL 91-606 funds for non-federal highways.

In the case of FHWA funds, Emergency Relief (ER) damage reports were prepared in the field by Penn DOT. These reports provided the basis for the development of programming documents which in turn were used to obtain FHWA approval for funding. As was described in the section on the Federal Department of Transportation, the programming documents provide the basis for FHWA's data base. At present there are 127 programming documents based on several thousands ER damage reports. It is estimated that eventually 155-160 programming documents will be required to handle all flood related damages.

For OEP funds, Penn DOT assisted in the preparation of Damage Survey Reports (DSR's) and prepared Project Applications (PA's). The data system maintained by OEP on PA's is described in the section on the Office of Emergency Preparedness.

Penn DOT did not maintain an automated data base on the damage reports and project applications; however, the Penn DOT comptroller

does maintain data on the status of projects. This data appears to be similar to the FHWA cost accounting data base described earlier.

In addition, Penn DOT has collected data on damage to the railroad system and mass transit systems within the state.

CONTACTS: Andrew Hedesh, (717) 787-7418

William S. Underwood, (717) 787-7540

William Polk, Executive Chief Engineers Office, (717) 787-7357

Ray Peteritas, Transportation and Railroads Division, Pennsylvania PUC, (717) 787-2325.

Pennsylvania Higher Education Assistance Agency

The Pennsylvania Higher Education Assistance Agency administered an Emergency Scholarship Assistance Program which will, by the end of the year, amount to a $3.4 million total expenditure of state flood relief funds.

Basically, the program is similar to the Scholarship Assistance Program which the agency administers as an ongoing effort. However, in the Emergency Scholarship Program, the applicant must show a need which occurred as a result of the flood. The agency received 4,500 applications and approved 3,900. All data on the application and approval forms are in a computerized data base which can be processed for analysis purposes. There were two different applications used in administering this program:

(a) Special Flood Application

(b) Reconsideration Form for State School Application, 1972-1973.

CONTACT: Kenneth Reeher, (717) 787-1937.

LOCAL GOVERNMENTS

Local governments or political subdivisions are a potentially valuable source of information; however, these sources present three major problems. First, there are more than 2,700 political subdivisions within the Commonwealth. Collection of data from all subdivisions, or even those which sustained severe flood damage would require an extensive and expensive effort. Second, since there is no centralized control, data obtained from the various subdivisions may not be compatible. Finally, many of the smaller subdivisions may not have computerized data bases; thereby, necessitating a manual review and processing of any data they may have.

In an attempt to identify the kinds of data available from these sources, contacts were made with several agencies within the Harrisburg city government. Within the city, there are three possible data sources:

(a) tax files and utility services
(b) construction/demolition permits
(c) special studies.

The tax files, along with water, sewer and trash collection charges are all included on a property master file which is computerized. The information contained in this file could be of value. First, the file contains the present appraised value of the property, with back up tapes for 1971 and 1972 appraised values. Second, the file has information on water usage and date of last reading. Analysis of this data may provide information on number of houses not occupied.

The tax data files maintained by the City of Harrisburg consist of a record for each property under its jurisdiction. Each record contains 62 fields. Some of the more important information contained in the file follows:

(a) street address of property
(b) zip code of property

(c) last two water meter readings

(d) date of last reading

(e) vacant code for water

(f) appraised value of land

(g) appraised value of improvement

(h) total appraised value.

Each political subdivision maintains control over construction within its boundaries through the issuance of construction/demolition permits. Data obtained from this system would provide information as to the status of housing stock. However, this permit system appears in general to be a manual system; therefore, it may be relatively expensive to obtain and maintain the data. In addition, it appears that many flood damaged structures were demolished without obtaining the necessary permits, particularly those removed by the Corps of Engineers.

Finally, the subdivision should be contacted to determine any special studies being performed which may relate to the flood damage/recovery data required. For example, the Harrisburg Redevelopment Authority has been conducting a survey of housing stock which would provide valuable information for a housing stock data base.

CONTACTS: Robert Sweigart, Director of Data Processing Center, (717) 238-7101, ext. 220

Ken Rebuck, Data Processing Center, (717) 238-7101, ext. 219

Dan Rodgers, Housing Authority, (717) 238-7101, ext. 215

Pete Grecko, Redevelopment Authority, Property Acquisition, (717) 238-7101, ext. 228

John Johnson, Redevelopment Authority, (717) 238-7101, ext. 214.

OTHER DATA SOURCES

There are several potential data sources which were identified that do not fall into any of three categories previously discussed. A brief discussion of these data sources is presented here.

U.S. Postal Service

The U.S. Postal Service maintains records of all reported changes in addresses. The procedure is as follows:

(a) A change of address card (POD Form 3575) is completed by the individual and mailed to the postmaster

(b) The postmaster forwards the card to the appropriate carrier who enters the information in his record book on POD Form 1564

(c) The carrier returns the card to the postmaster for filing

(d) If the change of address is cancelled, the carrier draws a line through the record on POD Form 1564 and records the date of cancellation.

The data available from the change of address information maintained by the U.S. Postal Service can provide information for the following elements of the Flood Damage/Recovery Data Base:

(a) number of families relocated

(b) number of families returning to original zip code

(c) number of families relocated to other local zip codes

(d) number of families relocated to non-local zip codes

(e) number of families remaining in temporary housing (trailers).

Although the data is available in only two written forms, i.e., the carrier's record book and the card files which would require a manual processing, the cost to develop the necessary data would not be prohibative. For example, to determine the number of families relocated because of the flood in Harrisburg only 12 carrier routes would have to be reviewed[176]. Because the change of address cards are not filed by carrier route, the most efficient way to collect the information would be to review the carrier record books.

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[176] Based upon data provided by Mr. Mason, U.S. Postal Service, Harrisburg, Pennsylvania, January 17, 1973.

Historical information pertaining to events occurring since the flood can be collected from the carrier record books. To collect historical data for the categories of information described above, the record books of carriers on both routes affected by a move should be reviewed.[177] In some cases this may be impractical, but many of the families displaced by the flood moved to the trailer parks. For these relocations, the routes can be easily identified. The data should be tabulated by quarter and should include number of families relocated from zip code A to zip code B. Update information can be gathered the same way as historical information. However, the update review would only have to cover the period since the last review.

One efficient way to collect the data would be to task local, areawide and regional planning commissions. OSPD should develop guidelines for the collection of the data, identify zip codes and routes which should be considered, and obtain permission from the U.S. Postal Service to collect the data.

The data obtained by the above procedure will not be 100% accurate in describing the flood related housing problems. Some of the changes of address may occur for other reasons. To determine the significance of these problems, a detailed review of a sample should be conducted, and if necessary, adjustment factors should be developed.

The Harrisburg Post Office has just completed a survey of vacant housing for the Redevelopment Authority of Harrisburg[178]. All this survey consisted of was to have each carrier tabulate and report the number of vacant houses on his route. Although this approach does not

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[177] For those temporary changes of address, only the route on which the person resided prior to the flood would have to be reviewed.

[178] Survey results are available from Lewis Milar, Redevelopment Authority of Harrisburg, Room 404, City Hall.

provide the information available from the above procedure, it would be less expensive and would be an alternative means of gathering information on the impact the flood has had on the housing stock.

CONTACTS: Carl Schmidt, Harrisburg Post Office, (717) 782-3700
Sidney Mason, Harrisburg Post Office, (717) 782-2240
George Kulp, Harrisburg Post Office, (717) 782-2240.

American Red Cross

The American Red Cross provides two types of services during a disaster. They offer immediate assistance to the disaster victims in the form of mass shelters, mass feeding, clothing, medical attention, etc. In addition, they provide individual family assistance which includes additional food, clothing, cleaning supplies, household supplies, and occupational supplies. In order to obtain individual assistance, the individual family must, in general, contact the American Red Cross.

Funds for these services are allocated by disbursing orders. The disbursing orders are used both by individuals to make purchases and by the American Red Cross to make mass purchases. The disbursing orders are made payable to the vendor from whom the purchase will be made. Items bought with these orders are not taxed.

The automatic data processing package used for Pennsylvania assistance is no longer considered operable because a new, improved disaster processing package is being developed. The old package only processed individual family data. Expenditure data (disbursing orders for individuals and for the masses) had to be processed manually.

The new system when completed will automatically process both the individual data and the expenditure data. It will also have automatic summary reports and statistical generating capabilities. At present these latter two items must be manually produced.

The individual family data base is called the Family Victim Information Data Base. The case register file for Pennsylvania is on tape and should be readily available. The Family Victim Information Data Base contains the following information:

(a) case number

(b) geographic data

  (1) state code

  (2) local Red Cross Chapter code

  (3) city code

  (4) service center code

(c) first contact data

  (1) day

  (2) month

  (3) year

(d) family identification

  (1) husband's and wife's name

  (2) pre-disaster address

    (a) state

    (b) street

    (c) city

    (d) zip code

(e) what happened

  (1) number of persons in household

  (2) number of persons aged 62 or older

  (3) number of persons aged 5 and under

  (4) number of persons in household unemployed due to disaster itself

  (5) ownership of family dwelling (rent or own)

  (6) damage to home (destroyed, major, minor, none, unknown)

  (7) family statement of inhabitability of home (inhabitable, non-inhabitable, unknown)

  (8) family estimate of temporary housing need (none, less than 30 days, less than 90 days, less than 6 months, 6 months or more, unknown)

(f) business loss to individual

(1) is business non-farm

(2) if farm, does the individual own it

(3) extent of damage (destroyed, major, minor, name, unknown)

(4) approximate number of employees in business destroyed

(g) additional information which will not be in new data base

(1) social security number

(2) primary and alternate telephone number

(3) name of county

(4) post disaster address.

The disbursing orders contain:

(a) the case number

(b) vendor to whom payable

(c) amount

(d) name of individual or mass purchase

(e) what is to be bought

(f) number of people subdivided by adults and children, for individual orders.

The case number relates individual purchases to the Family Victim Information Data Base.

Manual Summary reports can be generated in the following categories (with the new system this will be automated):

(a) Class 1 - expenses for mass care

(b) Class 2 - expenditures payable to families for food, clothing, and other maintenance

(c) Class 3 - expenditures for rebuilding and repair of owner occupied dwellings

(d) Class 4 - expenditures for household furnishings

(e) Class 5 - medical and nursing costs that are disaster related

(f) Class 6 - expenditures for occupation supplies and equipment.

For Pennsylvania, Classes 2, 4 and 6 aggregated to $15 million and 50,000 families were assisted.

In addition some statistical data is available based on random sampling. The new system will be capable of automatically producing comprehensive statistical data.

Types of statistical data includes are:

(a) total number of families affected

(b) total number of people affected

(c) total and average amount of assistance by category

(d) average assistance to families by age breakdown

(e) assistance given to individual whose unemployment was not or was only partially related to the disaster.

CONTACT: Gene Seevers, Data Processing, (202) 857-8227.

Dun and Bradstreet

After every disaster Dun and Bradstreet conducts a survey to maintain and update their credit rating system in a given area. This is accomplished by completing an "emergency business recovery form". The Pennsylvania Office of State Planning and Development (OSPD) currently is putting the Dun and Bradstreet survey data information on computer. The information can be withdrawn from the computer by county and two-digit Standard Industrial Classification (SIC) Code. The area in the western most portion of Pennsylvania around Pittsburgh was not included in the Dun and Bradstreet surveys.

Dun and Bradstreet estimated that nearly 6,000 businesses were damaged. However, less than 3,000 reports on damaged businesses have been filed. These reports are critical to the affected businesses as well as Dun and Bradstreet because any business loan normally requires both a loss appraisal and a current quote report from Dun and Bradstreet.

The Dun and Bradstreet information has been transferred to computer cards in the following sequence:

(a) the Dun and Bradstreet sequence number

(b) the SIC Code number

(c) evaluation number

(d) name of the firm

(e) address and zip code

(f) credit rating

(g) file date

(h) closed or open status

(i) operations status

(j) expected reopen date

(k) inventory damage

(l) fixture and machinery damage

(m) building damage

(n) total damage

(o) aggregate worth estimate

(p) expected recovery date

(q) sales for previous year

(r) net worth

(s) number of employees

(t) inventory, fixtures and building information

(u) insurance amount

(v) report source

(w) total damage.

CONTACT: Elaine King, Office of State Planning and Development, (717) 787-2019.

Pennsylvania Power and Light

The Pennsylvania Power and Light Company's accounting data base contains computerized data only for current customers. The data base includes:

(a) current meter reading

(b) customer identification

(c) billing data

(d) credit data

(e) discount

(f) billing and credit history

(1) five months data for monthly accounts

(2) eight months data for bi-monthly accounts.

Billing and credit history older than the above is available only in a manual form. Data about discontinued customers is also available only in a manual form.

The computerized data base would have been potentially useful had it been accessed while it contained billing information for the period just before and just after the flood.

CONTACT: Pennsylvania Power and Light Company, (717) 233-6581.

MATHEMATICA Corporation

The Urban Opinions Surveys division of the MATHEMATICA Corporation, under contract to Regional Planning Associates, conducted a survey of people in the flood damaged areas of Pennsylvania. The survey was concerned with the current housing situation of the people, their requirements for new housing and whether the flood affected family income. The survey answers have been analyzed to determine if the community can meet the additional housing requirements imposed by the flood.

The types of questions asked include the following:

(a) Is the family group living temporarily at its present address because its house was destroyed by the flood?

(1) If so, what is the previous address?

(2) What people living with the family would still live with the family if it moved?

(b) Does the family group own or rent? If you own,

(1) How much was house worth?

(2) What did you pay for mortgage, taxes, insurance, heat, etc.?

(3) Do you rent any part of your home?

(c) If you have to move, would you relocate in this town or elsewhere?

(1) Would you rent or buy?

(2) How many bedrooms do you need?

(3) Would you relocate to public housing if eligible?

(d) What was family income in 1971?

(1) Did the flood lower 1972 family income?

(2) If so, how much?

(3) As a result of the flood, will the family income continue to be lower in 1973?

CONTACTS: Walter Corson, MATHEMATICA Corporation, (609) 799-2600

Marvin Broder, Regional Planning Associates, (717) 344-1237.

University of Pennsylvania

The Department of Health, Education and Welfare, Social and Rehabilitation Service, Administration on Aging, is sponsoring a long term study on the impact of the flood on the aged in Pennsylvania. This study is being performed by Professor Elias Cohen, in the Department of Community Medicine at the University of Pennsylvania.

The purpose of this study is fourfold:

(a) to determine the impact of Tropical Storm Agnes on the elderly population of Pennsylvania

(b) to determine the reaction to this impact at the federal, state and local levels

(c) to determine what new agencies or other beaurocratic units were specially set up to deal with these problems

(d) to evaluate these reactions and institutional changes in Pennsylvania with the goal of planning for aid to the aged in future disasters.

The study will attempt to assess the impact on the affected aged population over a three year period. Three to five hundred aged will

be interviewed to obtain impact data. Interviews will be restricted to persons in nursing homes damaged by the flood.

Any additional age based data (e.g., HUD housing data) will be used to establish a baseline of initial social reaction. Baseline data is currently being gathered; analysis results will not be available until the end of this effort.

CONTACT: Prof. Elias Cohen, Department of Community Medicine, (215) 594-6914.

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